

Exhibit 10

MTBE RELEASE SOURCE IDENTIFICATION AT MARKETING SITES

A Study Conducted for EUSA ESD by
Exxon Research & Engineering Company

3/30/99

By: A. E. Liguori
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CONFIDENTIAL: This document is subject to the September 21, 1999 Stipula-
Protective Order entered by the San Francisco Superior Court, Case No. 999123

EXLIGU 07255

MTBE RELEASE SOURCE IDENTIFICATION AT MARKETING SITES
(A STUDY CONDUCTED FOR EUSA ESD)

I. Background

a. Study Basis

In August 1998, EUSA Environmental and Safety Division (ESD) requested Exxon Research and Engineering Company to conduct a study identifying potential release sources of the gasoline additive Methyl-Tertiary-Butyl Ether (MTBE) at Exxon retail marketing sites. Interest in identifying these potential sources is important to EUSA, as well as most other U.S. petroleum marketing companies because MTBE contamination is increasingly being found in surface and ground waters near gasoline service stations, and has been identified as a potential threat to public drinking water supply systems. By identifying the potential release sources, it is expected that all necessary and appropriate corrective measures can be taken so that accidental releases of MTBE into the subsurface environment can be prevented.

The objective of this study was to evaluate and categorize the extent and sources of MTBE contamination in soils and ground water at Exxon retail sites. A related objective is for EUSA to use results from this study to assist industry regulatory advocacy efforts with various state and federal environmental agencies. These agencies (with the state of California most notable) are addressing growing public concerns about potential MTBE human health effects, and are enacting regulations to require significant MTBE remediation programs and possibly the elimination of its use as a gasoline additive.

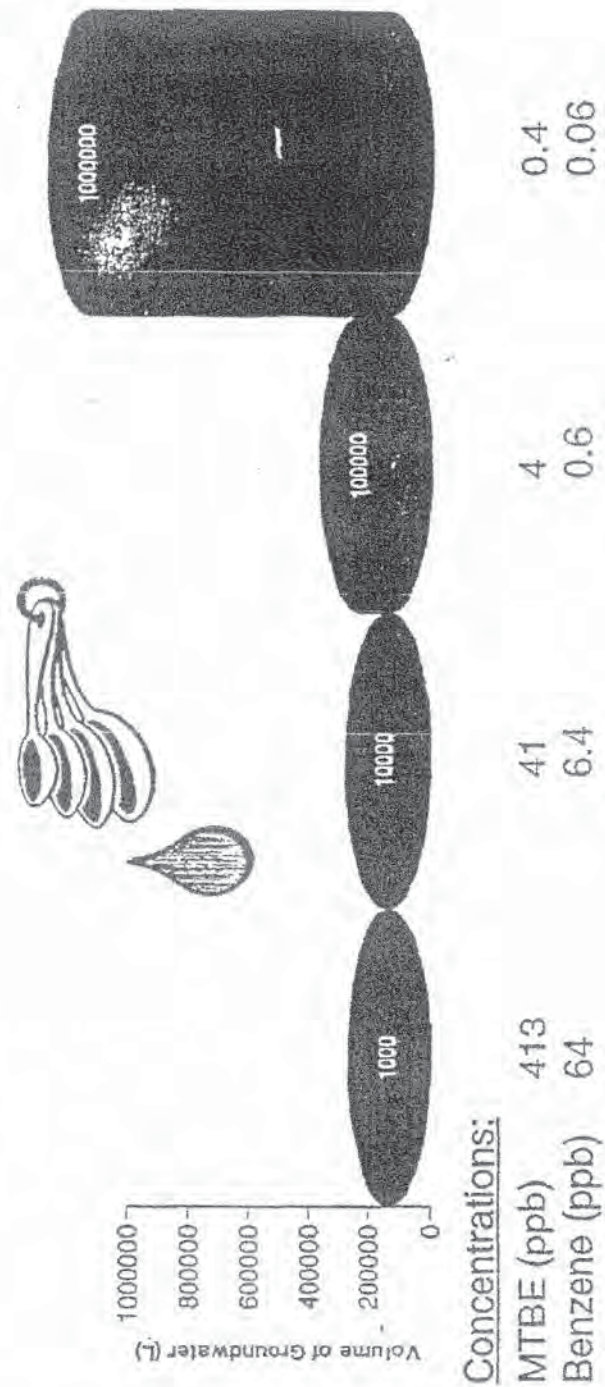
b. MTBE Contamination Issues at Marketing Retail Sites

Methyl tertiary-butyl ether (MTBE) is present in gasoline as an octane enhancer (concentrations up to 9% by volume) or as an oxygenate to reduce ozone and carbon monoxide levels in air (concentrations 11-15% by volume). The presence of MTBE found in surface, ground and drinking waters has been increasing. There are several reasons why increased MTBE presence can be a concern:

- MTBE behaves differently than other gasoline constituents, i.e. it is relatively:
 - more soluble in water,
 - more volatile from product to air,
 - less volatile when dissolved in water to air
 - less likely to adsorb to soil or organic carbon
 - relatively more resistant to biodegradation.
- There is an increase in awareness since the public can easily detect its existence
 - Taste and odor detectable threshold levels are in the ppb ranges (15-180 ppb)
- Small leaks of gasoline (1 teaspoon) can translate into MTBE ground water concentrations above the taste and odor detectable threshold levels. A standard

Figure I-1: Impact of Small Releases

1 Teaspoon of Gasoline ~ 5 ml
 Assume 11.5 vol. % MTBE, 1.5 vol. % Benzene
 Potential Impact on Groundwater a Function of Groundwater Volume



EXLIGU 07259

CONFIDENTIAL: This document is subject to the September 21, 1999 Sripula Protective Order entered by the San Francisco Superior Court. Case No. 999128.

<p style="text-align: right;">Page 1</p> <p>1 SUPERIOR COURT OF THE STATE OF CALIFORNIA</p> <p>2 COUNTY OF SAN FRANCISCO</p> <p>3 SOUTH TAHOE PUBLIC UTILITY :</p> <p>4 DISTRICT, :</p> <p>5 Plaintiff, : No. 999128</p> <p>6 vs. :</p> <p>7 ATLANTIC RICHFIELD COMPANY :</p> <p>8 ("ARCO"), et al., :</p> <p>9 Defendants. :</p> <p>10 COMMUNITIES FOR A BETTER :</p> <p>11 ENVIRONMENT, : Civil No.</p> <p>12 Plaintiff, : 997013</p> <p>13 vs. :</p> <p>14 UNOCAL CORPORATION, et al., :</p> <p>15 Defendants. :</p> <p>16 DEPOSITION OF FREDERICK M. ANDERSON</p> <p>17 Washington, D.C.</p> <p>18 Friday, August 4, 2000</p> <p>19</p> <p>20 REPORTED BY:</p> <p>21 LEE A. BURSTEN, R.P.R.</p> <p>22</p>	<p style="text-align: right;">Page 3</p> <p>1 SCOTT SUMMY, ESQ.</p> <p>2 GABRIEL REED, ESQ.</p> <p>3 Cooper & Scully, P.C.</p> <p>4 900 Jackson Street</p> <p>5 Suite 100</p> <p>6 Dallas, Texas 75202</p> <p>7 214-712-9509</p> <p>8 On behalf of Plaintiff Communities</p> <p>9 for a Better Environment</p> <p>10</p> <p>11 WILLIAM J. STACK, ESQ.</p> <p>12 Exxon Mobil Corporation</p> <p>13 800 Bell Street</p> <p>14 Houston, Texas 77002</p> <p>15 713-656-5961</p> <p>16 On behalf of Defendant Exxon Mobil</p> <p>17 Corporation</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p>
<p style="text-align: right;">Page 2</p> <p>1 Deposition of FREDERICK M. ANDERSON,</p> <p>2 called for examination pursuant to notice of</p> <p>3 deposition, on Friday, August 4, 2000, in</p> <p>4 Washington, D.C., at the offices of McDermott, Will</p> <p>5 & Emery, 600 Thirteenth Street, N.W., at 10:21 a.m.,</p> <p>6 before LEE A. BURSTEN, a Notary Public in and for</p> <p>7 the District of Columbia, when were present on</p> <p>8 behalf of the respective parties:</p> <p>9</p> <p>10 DUANE C. MILLER, ESQ.</p> <p>11 Miller, Sher & Sawyer, P.C.</p> <p>12 100 Howe Avenue</p> <p>13 Suite S120</p> <p>14 Sacramento, California 95825-8218</p> <p>15 916-924-8600</p> <p>16 On behalf of Plaintiff South Tahoe</p> <p>17 Public Utility District</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p>	<p style="text-align: right;">Page 4</p> <p>1 JANET MEISSNER PRITCHARD, ESQ.</p> <p>2 Arnold & Porter</p> <p>3 555 Twelfth Street, N.W.</p> <p>4 Washington, D.C. 20004-1206</p> <p>5 202-942-6254</p> <p>6 On behalf of Defendant Atlantic Richfield</p> <p>7 Company</p> <p>8</p> <p>9 ALSO PRESENT:</p> <p>10 T.J. O'TOOLE, Video Operator</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p>

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1 question. Are you talking about -- hold on a
 2 second. Were you talking about buying or selling
 3 when you asked the question?
 4 MR. MILLER: Buying.
 5 BY MR. MILLER:
 6 Q Did you understand that was the question?
 7 A I understood it as buying and selling.
 8 Q All right. Was it your practice at some
 9 point in time when you were buying a former gasoline
 10 station operated by someone else that you would
 11 sample that monitoring well you just described for
 12 the presence of MTBE?
 13 MR. STACK: I object to the form of the
 14 question. You can answer it if you can.
 15 THE WITNESS: At some point in time which
 16 I just do not recall -- and it may have been on a
 17 regional basis, it may have been on a state by state
 18 basis, that we started sampling for MTBE. I just
 19 don't recall, you know, when it happened. And then
 20 at some point it was unilateral that we started
 21 testing for MTBE along with BTEX and other
 22 constituents.

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1 BY MR. MILLER:
 2 Q So if we followed your career as an
 3 environmental engineer, you recall a period of time
 4 where you were not testing for MTBE, is that
 5 correct?
 6 A Yes.
 7 Q Then you recall a later period of time
 8 where you were testing for MTBE some of the time,
 9 correct?
 10 A Correct.
 11 Q And a later period of time where you were
 12 doing it on your own all the time, is that correct?
 13 A Yes.
 14 Q And at this point it's difficult to assign
 15 dates to each of those changes in your practice, is
 16 that correct?
 17 A Yes.
 18 Q Is it fair to say that you worked as an
 19 environmental engineer for Exxon for several years
 20 before they started testing for MTBE in their
 21 sampling?
 22 MR. STACK: I object to the form of the

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1 question. He's already indicated he can't recall.
 2 THE WITNESS: Yes.
 3 BY MR. MILLER:
 4 Q And is it also fair to say that your
 5 unilateral routine MTBE testing at all sites
 6 occurred close to 1991 when you stopped being an
 7 environmental engineer?
 8 MR. STACK: I object to the form of the
 9 question. He's already indicated he can't recall.
 10 THE WITNESS: I'll answer your question
 11 no.
 12 BY MR. MILLER:
 13 Q Explain your answer, please.
 14 A I would -- to the best of my recollection,
 15 I would say we probably started testing for MTBE
 16 closer to 1986 than 1991.
 17 Q Okay. But you can't be more precise in
 18 your estimate of that, is that fair to say, at this
 19 point?
 20 A I'll answer it this way. Again, because
 21 of my experience in finding MTBE in 1980, again, to
 22 the best of my recollection, I personally probably

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1 on the sites that I was managing started testing for
2 MTBE in the states that I was operating in.
 3 Q Where did you find MTBE in 1980?
 4 A In Jacksonville, Maryland.
 5 Q Was there a drinking water well involved?
 6 A I'll answer it this way: A potential
7 drinking water well. It happened in a subdivision
8 that had just been developed. And the private water
9 wells on each individual lot were drilled, but there
10 was no people -- in fact there were no houses built.
11 The wells had been installed, but no houses had yet
12 been developed. We'll say they were future potable
13 wells.
 14 Q And did you determine that MTBE had made
15 its way to those wells?
 16 A Yes.
 17 Q So were the wells ever used for drinking
 18 water purposes?
 19 A No.
 20 Q Why not?
 21 A Because the -- well, at least in the time
 22 period that I was working that project, which was

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1 there impacts on drinking water wells associated
2 with MTBE in that town?

3 MR. STACK: I object to the form of the
4 question. You can answer if you can.

5 THE WITNESS: My understanding was there
6 was a contamination problem associated with gasoline
7 in Rockaway, and then subsequently after that time,
8 after the initial whatever that I found out about,
9 that the subject of MTBE came up. But again, the
10 primary problem associated with Rockaway was a
11 gasoline contamination problem, not an MTBE problem.

12 BY MR. MILLER:

13 Q When did you learn that MTBE could make
14 drinking water undrinkable because it imparted an
15 unpleasant taste, odor, or both?

16 MR. STACK: I object to the form of the
17 question. You can answer, if you can.

18 THE WITNESS: Sometime in the 1980s.

19 BY MR. MILLER:

20 Q And how did you learn that?

21 A I don't specifically remember. It could
22 have been news reports, it could be industry

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1 reports. I just don't remember.

2 (Anderson Exhibits 6 and 6-A were
3 identified.)

4 BY MR. MILLER:

5 Q Let me show you Exhibit 6 to your
6 deposition. In this case plaintiff requested and
7 obtained production from four states of Exxon sites
8 which had MTBE detections between 1980 and 1990.
9 And we compiled a list which I've handed to you.
10 Some of the sites are in New Jersey. During
11 portions of that period would you have supervised
12 sites in New Jersey?

13 MR. STACK: I object to the form of the
14 question. There's no indication of the dates of any
15 of the incidents indicated on Exhibit 6.

16 THE WITNESS: The answer is yes, but I
17 want to clarify again, you keep using the word
18 "supervised," and that's not what I did.

19 BY MR. MILLER:

20 Q All right. Would the word "manage" be
21 more acceptable?

22 A Yes.

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1 Q All right. Did you manage sites between
2 part of that time period in North Carolina which has
3 some cities on this list?

4 A Only during the time period that I've
5 discussed before, when I was the temporary acting
6 supervisor in early 1988. And I was not managing
7 the sites in North Carolina. That was being done by
8 the environmental engineer responsible for North
9 Carolina, whom I don't remember who that was. But I
10 was supervising the engineer at that time, not
11 managing the sites at North Carolina.

12 Q Did Exxon have any stations in Maine
13 during that period?

14 A Yes.

15 Q Were there any MTBE sites under your
16 management during that period?

17 MR. STACK: I object to the form of the
18 question. You can answer, if you can.

19 BY MR. MILLER:

20 Q In Maine.

21 MR. STACK: I object to the form of the
22 question. You can answer.

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1 THE WITNESS: Again, tell me the period.

2 BY MR. MILLER:

3 Q 1980 to 1990.

4 A Yes.

5 Q Did you ever manage sites in Rhode Island?

6 A Yes.

7 Q And did Exxon have stations in Rhode
8 Island?

9 A Yes.

10 Q And did you manage any MTBE sites in Rhode
11 Island at any time between 1980 and 1990?

12 MR. STACK: I object to the form of the
13 question. I believe the witness has made clear he
14 didn't respond to MTBE. He responded to gasoline.
15 You can answer it, if you can.

16 THE WITNESS: I don't recall if any of the
17 sites in Rhode Island had MTBE associated with them.

18 BY MR. MILLER:

19 Q Did you manage Exxon stations in that
20 state during portions of that time period?

21 MR. STACK: I object to the form of the
22 question.

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1 Q And what are some of those events that can
 2 occur that can lead to a release of gasoline and
 3 gasoline containing MTBE where it's not a release
 4 from the underground storage tank system?
 5 MR. STACK: Mr. Summy, just to clarify so
 6 you don't get a nonresponsive answer, you're looking
 7 for releases that affect groundwater?
 8 MR. SUMMY: Yes.
 9 MR. STACK: As distinguished from any kind
 10 of release?
 11 MR. SUMMY: Yes.
 12 MR. STACK: Okay.
 13 THE WITNESS: Well, potentially, and I use
 14 that word in a very broad sense, potentially it
 15 could occur during the transfer operation of
 16 dropping the gasoline from the tank truck into the
 17 underground tank.
 18 And in some very rare kind of -- in
 19 special situations it could occur as a consequence
 20 of some kind of an above ground spill associated
 21 with a customer, either doing what we call a
 22 drive-off where they have the nozzle in the gasoline

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1 tank and they drive off, forgetting that the nozzle
 2 was there, and a small amount of product is spilled,
 3 or with just repeated dribs and drabs associated
 4 with coming out of the nozzle, just as a part of the
 5 normal service station operation.
 6 BY MR. SUMMY:
 7 Q In fact, at a retail service station isn't
 8 it true that there could be releases from the
 9 underground storage tank system that are small but
 10 are continuous, that are not caught until later in
 11 time?
 12 MR. STACK: I object to the form of the
 13 question. You can answer, if you can.
 14 THE WITNESS: Yes.
 15 BY MR. SUMMY:
 16 Q Is that commonly known as a continuous
 17 release?
 18 MR. STACK: I object.
 19 BY MR. SUMMY:
 20 Q Rather than a catastrophic release?
 21 MR. STACK: I object to the form of the
 22 question. Vague and ambiguous. You can answer, if

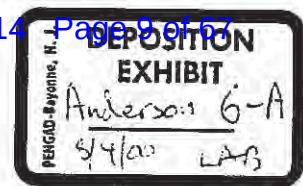
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1 you can.
 2 THE WITNESS: I wouldn't characterize it
 3 as a continuous release. I would characterize it as
 4 a large number of very small inconsequential dribs
 5 and drabs and drive-off, and it's the accumulation
 6 of all of that taking place over many, many years.
 7 BY MR. SUMMY:
 8 Q After Exxon began to add MTBE to its
 9 gasoline in 1986, are you aware of any effort by
 10 Exxon to determine what private wells and public
 11 wells existed in close proximity to its stations?
 12 A As I testified to earlier, we did that
 13 well before the introduction of MTBE in our
 14 gasoline. Our concern is with gasoline, not MTBE.
 15 Q Okay. And after Exxon introduced MTBE
 16 into its gasoline in 1986, are you aware of any
 17 effort by Exxon to notify each and every well owner
 18 within close proximity to each and every retail
 19 service station of MTBE's existence and its
 20 characteristics in groundwater?
 21 MR. STACK: I object to the form of the
 22 question. Calls for a legal conclusion, and calls

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1 for speculation. You can answer, if you can.
 2 THE WITNESS: No.
 3 MR. SUMMY: That's all I have.
 4 MR. MILLER: I have a couple of follow-up
 5 questions.
 6 EXAMINATION
 7 BY MR. MILLER:
 8 Q You've indicated that you had a program to
 9 identify and test wells in the area of a gasoline
 10 release before MTBE was produced into gas.
 11 MR. STACK: Objection, counsel. I think
 12 you misspoke. He said identify, but I don't believe
 13 he said test. I don't believe he said test.
 14 BY MR. MILLER:
 15 Q First of all, was it to identify?
 16 A It was to identify, and then as a further
 17 part of our investigation, if it showed that in fact
 18 a release had occurred and that it had migrated
 19 off-site or it was on its way to migrating off-site,
 20 and we made an assessment that there was a potential
 21 for the contamination to reach a potable well, then
 22 we would go and test that well.

South Tahoe PUD Litigation
Exxon Site/MTBE Mitigation



Location	Address	Year	Anderson Document(s) (Y/N)	Bates Range	Box No.
None Listed, NJ	415 Kennedy Mem	1990	N	EX 4S 004859 - 4867	2
Absecon, NJ	Route 9 & White Horse Pike (Route 30)	1989	Y	EX 4S 000616 - 714	1
Ahoskie, NC	None Listed	1987	N	EX 4S 009174 - 9192	5
Allendale, NJ	Myrtle Ave.	1983	Y	EX 4S 009852 - 9866	6
Allendale, NJ	41 Myrtle Avenue	1983	N	EX 4S 000536 - 615	1
Allendale, NJ	41 Myrtle Avenue	1989	Y	EX 4S 013063 - 13083	8
Asheville, NC	1129 Patton Avenue	1988	N	EX 4S 008989 - 9173	5
Ashville, NC	2939 The Plaza	1988	N	EX 4S 007103 - 7513	4
Auburn, ME	484 Center Street	1990	N	EX 4S 004841 - 4858	2
Augusta, ME	Civic Center Drive	1988	Y	EX 4S 004784 - 4798	2
Augusta, ME	262 Western Ave.	1988	N	EX 4S 004828 - 4840	2
Avenel, NJ	None Listed	1989	N	EX 4S 009351 - 9353	6
Avenel, NJ	2540 Randolph Ave.	1988	Y	EX 4S 009884 - 9894	6
Avenel, NJ	2540 Randolph Avenue	1989	Y	EX 4S 011091 - 11152	7
Basking Ridge (Millington), NJ	Route I-78 & King George Road	1990	Y	EX 4S 001398 - 1449	1
Basking Ridge, NJ	10 East Henry Street	1985	N	EX 4S 103950 - 14957	10
Bayonne, NJ	1194 Kennedy Boulevard	1990	N	EX 4S 010724 - 10738	7
Bayonne, NJ	1194 Kennedy Boulevard	1990	N	EX 4S 103891 - 14923	10
Bedminster, NJ	Rt. 206 & Lamington Road	1989	N	EX 4S 007931 - 7993	5
Belmont, NC	U.S. Hwy. 74 & N. Main St.	1989	N	EX 4S 004385 - 4452	2
Belmont, NC	None Listed	1989	N	EX 4S 005956 - 6070	3
Belmont, NC	North Main Street and U.S. Highway 74	1989	N	EX 4S 006107 - 6155	3
Belmont, NC	U.S. Highway 74 and North Main Street	1989	N	EX 4S 006156 - 6162	3
Belmont, NC	300 East Wilkerson Blvd.	1989	N	EX 4S 006373 - 6380	4
Belmont, NC	300 E. Wilkerson Blvd.	1989	N	EX 4S 006381 - 6392	4
Belmont, NC	N. Main St. & U.S. Hwy 74	1989	N	EX 4S 008403 - 8529	5
Belmont, NC	N. Main St. & U.S. Hwy 74	1989	N	EX 4S 008668 - 8668	5
Bloomfield, NJ	None Listed	1990	N	EX 4S 004250 - 4252	2
Bloomfield, NJ	None Listed	1991	N	EX 4S 008972 - 8988	5
Bloomfield, NJ	75 Bellville Avenue	1990	N	EX 4s 013401 - 13410	9
Bloomington, NJ	43 Main Street	1990	Y	EX 4S 003908 - 3961	2
Borough of Closter, NJ	681 Piermont Road	1988	N	EX 4S 001937 - 1942	1
Bound Brook, NJ	Route 28 & Vosseller Ave.	1987	N	EX 4S 009987 - 9999	6
Bound Brook, NJ	Route 28 & Vosseller Ave.	1989	Y	EX 4S 010079 - 10164	6
Bound Brook, NJ	310 West Union Avenue	1990	N	EX 4S 010376 - 10379	7
Branchburg, NJ	None Listed	1989	Y	EX 4S 011854 - 11881	8
Brielle, NJ	None Listed	1986	Y	EX 4S 004673 - 4675	2
Budd Lake, NJ	Route 46 East	1990	Y	EX 4S 004676 - 4716	2
Burlington, N.C.	2160 Alamance Road	1990	N	EX 4S 006874 - 6978	4
Burlington, NC	2160 Alamance Road	1987	N	EX 4S 006519 - 6528	4
Burlington, NC	2160 Alamance Road	1988	N	EX 4S 006529 - 6537	4
Burlington, NC	2415 Maple Avenue	1990	N	EX 4S 009237 - 9261	5
Burlington, NC	351 S. Church Street	1991	N	EX 4S 013614 - 13631	9
Burlington, NC	351 South Church Street	1990	N	EX 4S 013648 - 13712	9
Burlington, NJ	Salen and Sunset Roads	1990	Y	EX 4S 005170 - 5220	3
Camden, NJ	254 Marlton Pike	1989	N	EX 4S 010643 - 10680	7

South Tahoe PUD Litigation
Exxon Site/MTBE Mitigation

Location	Address	Year	Anderson Document(s) (Y/N)	Bates Range	Box No.
Camden, NJ	245 Marlton Pike & Baird Bvd	1999	N	EX 4S 012076 - 12093	8
Chapel Hill, NC	126 West Franklin Street	1989	N	EX 4S 008388 - 8398	5
Charlotte, NC	4511 Randolph Rd.	1989	N	EX 4S 004453 - 4460	2
Charlotte, NC	Intersection of I-85 and Little Rock Road	1990	N	EX 4S 005824 - 5829	3
Charlotte, NC	3416 Freedom Drive	1989	N	EX 4S 006071 - 6106	3
Charlotte, NC	3721 Freedom Drive	1991	N	EX 4S 007732 - 7735	5
Charlotte, NC	6800 Freedom Drive	1989	N	EX 4S 008530 - 8667	5
Charlotte, NC	6800 Freedom Drive	1989	N	EX 4S 008669 - 8795	5
Charlotte, NC	Freedom Drive & Old Mount Holly Road	1989	N	EX 4S 008796 - 8878	5
Charlotte, NC	1635 East 4th Street	1989	N	EX 4S 008879 - 8971	5
Charlotte, NC	Paw Creek Terminal	1990	N	EX 4S 009507 - 9525	6
Charlotte, NC	None Listed	1989	N	EX 4S 010410 - 10446	7
Charlotte, NC	6800 Freedom Drive	1989	N	EX 4S 010953 - 10976	7
Charlotte, NC	None Listed	None Listed		EX 4S 012414 - 12434	
Charlotte, NC	I-77 and Woodlawn Road	1991	N	EX 4S 013328 - 13371	9
Charlotte, NC		1989	N	EX 4S 013640 - 13641	9
Charlotte, NC	2939 The Plaza	1989	N	EX 4S 013734 - 13779	9
Charlotte, NC	6801 Freedom Drive	1991	N	EX 4S 014398 - 14463	10
Charlotte, NC	6800 Freedom Drive	1989	N	EX 4S 103924 - 14944	10
Chatham, NJ	Main Street (Route 24) & Hillside Avenue	1990	N	EX 4S 010350 - 10364	7
Chatham, NJ	Main St. & Hillside Ave.	1998	N	EX 4S 011805 - 11809	8
Cherry Hill, NJ	Route 70 and Marlkrass Rd.	1988	N	EX 4S 002529 - 2554	2
Cherry Hill, NJ	1701 Marlton Pike	1987	Y	EX 4S 004239 - 4249	2
Cherry Hill, NJ	1434 Brace Road	1989	Y	EX 4S 006393 - 6504	4
Cherry Hill, NJ	Rte 70 & Marlkrass Rd.	1999	N	EX 4S 012063 - 12075	8
Cherry Hill, NJ	Rte 70 & Springdale Road	1998	N	EX 4S 013117 - 13127	8
Cinnaminson, NJ	Route 130 & Cinnaminson Ave.	1990	N	EX 4S 004253 - 4266	2
Clarksburg, NJ	Routes 537 & 526	1989	Y	EX 4S 009916 - 9986	6
Clarksburg, NJ	Routes 537 & 526	1989	Y	EX 4S 012020 - 12041	8
Clarksburg, NJ	Rtes 526 & 537	1989	Y	EX 4S 012200 - 12263	8
Clarksburg, NJ	Rtes 526 & 537	1997	N	EX 4S 012849 - 12863	8
Clementon, NJ	Whitehorse Pike & Gibbsboro Rd.	1989	N	EX 4S 004364 - 4373	2
Clementon, NJ	U.S. Route 30 - White Horse pike	1989	Y	EX 4S 006610 - 6673	4
Cliffwood, NJ	Rt. 35 and Cliffwood Ave.	1989	N	EX 4S 006505 - 6508	4
Cliffwood, NJ	Rt. 35 and Cliffwood Ave.	1988	Y	EX 4S 006509 - 6518	4
Cliffwood, NJ		1986	N	EX 4S 006538 - 6539	4
Clifton, NJ	Grove Street	1990	Y	EX 4S 012494 - 12513	8
Clifton, NJ	872 Grove St.	1982	Y	EX 4S 003171 - 3197	2
Clinton, NJ	53 Old Highway 22	1989	Y	EX 4S 005260 - 5288	3
Closter, NJ	Closter Dock & Piermont Roads	1988	N	EX 4S 010891 - 10901	7
Collingswood, NJ	1150 Haddon Ave.	1986	Y	EX 4S 004374 - 4384	2
Columbus, NJ	Route 206 & Route 68	1987	Y	EX 4S 000002 - 151	1
Columbus, NJ	None Listed	1987	N	EX 4S 000299 - 307	1
Columbus, NJ	Route 206 & Old York Road	1987	N	EX 4S 011058 - 11063	7

South Tahoe PUD Litigation
Exxon Site/MTBE Mitigation

Location	Address	Year	Anderson Document(s) (Y/N)	Bates Range	Box No.
Cranford, NJ	Lehigh & Centennial Avenues	1989	Y	EX 4S 001525 - 1588	1
Cranford, NJ	310 Centennial Avenue	1999	N	EX 4S 011891 - 11898	8
Culvers Lake, NJ	Route 206	1990	N	EX 4S 005289 - 5294	3
Denville, NJ	Route 10 & Franklin Road	1990	Y	EX 4S 001450 - 1524	1
Denville, NJ	Route 10 & Franklin Ave.	1990	Y	EX 4S 009483 - 9492	6
Denville, NJ	30 West Main Street	1995	N	EX 4S 011270 - 11280	7
Denville, NJ	West Main & Hinchman Ave.	1990	N	EX 4S 012563 - 12591	8
Durham, NC	3458 Hillsborough Road	1995	N	EX 4S 013713 - 13733	9
Durham, NC	3458 Hillsboro Road	1989	N	EX 4S 006272 - 6301	4
Durham, NC	2516 Guess Road	1989	N	EX 4S 013469 - 13568	9
East Orange, NJ	516 William Street	1989	Y	EX 4S 011281 - 11316	7
East Orange, NJ	516 William Street	1989	Y	EX 4S 011392 - 11463	7
East Orange, NJ	2 North Oraton Parkway	1990	Y	EX 4S 011785 - 11804	8
East Orange, NJ	2 North Oraton Parkway	1990	N	EX 4S 012541 - 12562	8
Easton, NJ	Routes 35 & 36	1989	N	EX 4S 010767 - 10795	7
Eatontown, NJ	Routes 35 & 36	1989	Y	EX 4S 010000 - 10027	6
Edison, NJ	3115 Woodbridge Avenue	1988	Y	EX 4S 002404 - 2473	1
Edison, NJ	Route 27 and Wood Ave.	1989	N	EX 4S 003788 - 3792	2
Edison, NJ	Route 27 and Wood Ave.	1989	Y	EX 4S 003793 - 3802	2
Edison, NJ	Route 27 and Wood Ave.	1989	Y	EX 4S 003803 - 3858	2
Edison, NJ	Route 1 & Parsonage Road	1987	N	EX 4S 010796 - 10800	7
Edison, NJ	3115 Woodbridge Avenue	1988	N	EX 4S 011067 - 11073	7
Edison, NJ	Route 1 & Parsonage Road	1989	Y	EX 4S 013976 - 14011	10
Elizabeth, NJ	Routes 1 & 9 @ Hetfield Avenue	1989	Y	EX 4S 001854 - 1936	1
Elizabeth, NJ	312 Atlantic Street	1988	Y	EX 4S 002212 - 2267	1
Elizabeth, NJ	556 Westfield & Elmora Aves.	1985	Y	EX 4S 003287 - 3330	2
Elizabeth, NJ	Routes 1&9 @ Hetfield Ave.	1989	Y	EX 4S 009370 - 9380	6
Elizabeth, NJ	Bayway & Brunswick Aves.	1988	N	EX 4S 009501 - 9506	6
Elizabeth, NJ	312 Atlantic Avenue	1998	N	EX 4S 013084 - 13089	8
Elizabeth, NJ	Westfield & Elmora Aves.	1998	N	EX 4S 013090 - 13109	8
Elizabeth, NJ	Rte 1 & 9 & Hetfield Ave.	1998	N	EX 4S 013110 - 13116	8
Elmwood Park, NJ	210 Route 46 & Mill Street	1986	N	EX 4S 014057 - 14066	10
Englewood, NJ	Orchard Street & Hudson Avenue	1983	N	EX 4S 000983 - 1062	1
Englewood, NJ	120 Route 4 East	1989	N	EX 4S 002634 - 2667	2
Englewood, NJ	120 Route 4 East	1990	N	EX 4S 002668 - 2689	2
Englewood, NJ	426 Grand Ave.	1990	N	EX 4S 003670 - 3715	2
Englewood, NJ	484 Route 4 East	1989	Y	EX 4S 004267 - 4299	2
Englewood, NJ	484 Route 4 East	1989	N	EX 4S 004300 - 4363	2
Englewood, NJ	Orchard St. & Hudson Ave.	1983	Y	EX 4S 009647 - 9670	6
Englewood, NJ	476 Grand Ave & Rockwood Place	1994	N	EX 4S 012107 - 12133	8
Englishtown, NJ	Route 9 & Taylors Mill Road	1990	N	EX 4S 001228 - 1276	1
Englishtown, NJ	Route 527 and Gordons Corner Road	1990	Y	EX 4S 005516 - 5584	3
Englishtown, NJ	Route 527 and Gordons Corner Road	1990	N	EX 4S 005585 - 5602	3
Englishtown, NJ	Route 527 and Gordons Corner Road	1998	N	EX 4S 005603 - 5612	3
Englishtown, NJ	None Listed	1990	N	EX 4S 009345 - 9347	6

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Fairlawn, NJ	22 - 02 Fairlawn Ave.	1987	N	EX 4S 002989 - 3004	2
Fairlawn, NJ	22 - 02 Fairlawn Ave.	1989	N	EX 4S 003005 - 3042	2
Fairlawn, NJ	22 - 02 Fairlawn Ave.	1990	Y	EX 4S 003043 - 3170	2
Fairlawn, NJ	Plaza Road and Morlot Avenue	1994	N	EX 4S 006163 - 6174	3
Fairlawn, NJ	22-02 Fairlawn Avenue	1990	Y	EX 4S 007654 - 7731	5
Fairlawn, NJ	Fairlawn Ave. & Plaza Rd.	1987	Y	EX 4S 011465 - 11541	8
Fanwood, NJ	Route 28 & Terrill Road	1988	Y	EX 4S 000308 - 403	1
Fanwood, NJ	Terril Road & South Avenue	1988	N	EX 4S 011252 - 11263	7
Farmingdale, NJ	Routes 33 & 34	1990	N	EX 4S 009328 - 9338	6
Farmingdale, NJ	Routes 33 & 34	1990	N	EX 4S 010028 - 10062	6
Fayetteville, N.C.	552 McPherson Church Rd.	1989	N	EX 4S 006674 - 6779	4
Fayetteville, NC	6489 Yadkin Road	1989	N	EX 4S 005830 - 5840	3
Fayetteville, NC	2302 Gillespie Street	1990	N	EX 4S 005841 - 5915	3
Fayetteville, NC	2302 Gillespie Street	1989	N	EX 4S 005916 - 5933	3
Fayetteville, NC	2302 Gillespie Street	1990	N	EX 4S 013131 - 13263	9
Fayetteville, NC	Cliffdale Road and Highway 401 By-Pass	1990	N	EX 4S 013264 - 13327	9
Flemington, NJ	Rtes 202 & 31	1989	N	EX 4S 012156 - 12199	8
Flemington, NJ	Rtes 202 & 31	1990	N	EX 4S 012523 - 12540	8
Flemington, NJ	Rtes 202 & 31	1991	N	EX 4S 012614 - 12667	8
Flemington, NJ	Rtes 202 & 31	1995	N	EX 4S 012769 - 12794	8
Forked River, NJ	None Listed	1987	N	EX 4S 003863 - 3907	2
Forked River, NJ	None Listed	1987	N	EX 4S 012689 - 12721	8
Fort Lee, NJ	2336 Route 4 West	1988	N	EX 4S 001183 - 1198	1
Fort Lee, NJ	2143 Route 4 East	1989	Y	EX 4S 001804 - 1853	1
Fort Lee, NJ	1175 Palisade Avenue & Route 5	1989	Y	EX 4S 010174 - 10212	7
Fort Lee, NJ	2336 Route 4 West	1990	Y	EX 4S 011601 - 11636	8
Fort Lee, NJ	1175 Palisades Ave & Rte 5	1998	N	EX 4S 012134 - 12155	8
Fort Lee, NJ	2143 Route 4 East	1990	N	EX 4S 013128 - 13134	8
Fort Lee, NJ	2336 Route 4 West	1988	N	EX 4S 014306 - 14364	10
Franklin Park, NJ	Route 27 & Henderson Road	1989	Y	EX 4S 001105 - 1182	1
Franklin Park, NJ	Route 27 and Henderson Road	1989	Y	EX 4S 007515 - 7653	5
Franklin Park, NJ	Route 27 & Henderson Rd.	1989	Y	EX 4S 009348 - 9350	6
Franklin, NJ	Route 23 North	1989	Y	EX 4S 001589 - 1670	1
Freehold, NJ	Routes 9 & 524	1989	N	EX 4S 009397 - 9408	6
Freehold, NJ	Main & Spring Streets	1988	N	EX 4S 010842 - 10860	7
Freehold, NJ	Route 9 & Adelphia Road	1990	N	EX 4S 011048 - 11052	7
Freehold, NJ	Route 9 & Schank Rd.	1991	N	EX 4S 011940 - 11955	8
Freehold, NJ	Rte 9 & Adelphi Road	1999	N	EX 4S 011995 - 12003	8
Freehold, NJ	None Listed	1998	N	EX 4S 012466 - 12475	8
Frelinghuysen Township, NJ	Allamuchy-Johnsonburg Road & Rte 519	1993	N	EX 4S 012050 - 12062	8
Glassboro, NJ	Route 553 and College Ave.	1987	Y	EX 4S 002555 - 2633	2
Gloucester, NJ	Blackwood-Clementon & Little Gloucester Roads	1987	Y	EX 4S 002125 - 2211	1
Greensboro, NC	4408 Groometown Road	1994	N	EX 4S 007736 - 7744	5
Greensboro, NC	3701 High Point Road	1991	N	EX 4S 007994 - 8023	5
Greensboro, NC	3011 High Point Road	1988	N	EX 4S 008265 - 8387	5

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Greensboro, NC	3701 High Point Road	1994	N	EX 4S 008399 - 8402	5
Greensboro, NC	6907 West Market Street	1988	Y	EX 4S 011956 - 11976	8
Hackensack, NJ	495 Hudson Street	1989	Y	EX 4S 002012 - 2037	1
Hackensack, NJ	495 Hudson Street	1989	N	EX 4S 014039 - 14048	10
Haddonfield, NJ	One Centennial Square	1989	N	EX 4S 013590 - 13613	9
Haledon, NJ	478 Haledon Ave.	1989	Y	EX 4S 003331 - 3401	2
Haledon, NJ	478 Haledon Avenue	1988	Y	EX 4S 010739 - 10765	7
Hamilton, NJ	New Jersey Turnpike Richard Stockton Service Area 6S	1988	N	EX 4S 010887 - 10890	7
Hammonton, NJ	Route 54 and Route 30	1989	N	EX 4S 002513 - 2528	2
Hammonton, NJ	White Horse Pike and Bellevue Avenue	1991	Y	EX 4S 008163 - 8234	5
Hammonton, NJ	Rte 54 & Rte 30	1999	N	EX 4S 012094 - 12106	8
Hasbrouck Heights, NJ	None Listed	1990	N	EX 4S 000173 - 242	1
Hasbrouck Heights, NJ	180 Grandview Blvd.	1990	Y	EX 4S 009671 - 9689	6
Hazlet, NJ	Route 35 & Holmdel Road	1994	N	EX 4S 004897 - 4908	3
Hazlet, NJ	Route 35 & Holmdel Road	1990	Y	EX 4S 004909 - 4969	3
Hazlet, NJ	Route 35 & Holmdel Road	1990	Y	EX 4S 005664 - 5718	3
Hillsborough, NJ	Route 206 & Triangle Road	1990	N	EX 4S 013585 - 13589	9
Hopewell, NJ	None Listed	1990	Y	EX 4S 000243 - 298	1
Hopewell, NJ	71 East Broad Street	1990	N	EX 4S 010395 - 10406	7
Kearny, NJ	None Listed	1990	N	EX 4S 010380 - 10384	7
Kendall Park, NJ	Route 27 & New Road	1989	Y	EX 4S 002268 - 2318	1
Kendall Park, NJ	Route 27 & New Road	1990	N	EX 4S 011043 - 11045	7
Lakehurst, NJ	Rt. 70 & Eisenhower Circle	1987	N	EX 4S 008109 - 8162	5
Lawrenceville, NJ	2551 Brunswick Avenue	1987	N	EX 4S 010229 - 10257	7
Lawrenceville, NJ	Route 1A and Johnson Road	1987	Y	EX 4S 010548 - 10634	7
Ledgewood, NJ	None Listed	1990	N	EX 4S 005507 - 5515	3
Linden, N.J.	636 East Elizabeth Ave.	1989	Y	EX 4S 006780 - 6873	4
Linden, NJ	110 U.S. Highway	1989	N	EX 4S 005948 - 5955	3
Little Ferry, NJ	319 Route 46	1991	N	EX 4S 006302 - 6305	4
Little Ferry, NJ	319 Route 46	1988	N	EX 4S 006306 - 6314	4
Lodi, NJ	460 North Main Street	1990	N	EX 4S 000159 - 172	1
Lodi, NJ	460 North Main Street	1990	N	EX 4S 007773 - 7802	5
Lodi, NJ	460 Main Street	1990	N	EX 4S 014067 - 14071	10
Lyndhurst Township, NJ	555 Riverside Avenue	1990	N	EX 4S 014050 - 14056	10
Lyndhurst, NJ	555 Riverside Avenue	1990	N	EX 4S 010681 - 10718	7
Madison, NJ	122 Main Street	1989	Y	EX 4S 003402 - 3569	2
Madison, NJ	None Listed	1999	N	EX 4S 011977 - 11994	8
Maple Shade, NJ	None Listed	1989	N	EX 4S 004877 - 4896	3
Marlton, NJ	Main Street and Evans Road	1989	Y	EX 4S 005363 - 5378	3
Marlton, NJ	Rte 70 & Old Marlton Road	1991	N	EX 4S 012744 - 12768	8
Marlton, NJ	None Listed	1988	N	EX 4S 013870 - 14877	10
Matawan, NJ	Route 34 & Lloyd Rd.	1990	N	EX 4S 003226 - 3253	2
Matawan, NJ	339 Matawan Road and Laurence Harbor Road	1985	N	EX 4S 010635 - 10642	7
Mattawan, NJ	Rte 34 & Lloyd Road	1993	N	EX 4S 012004 - 12008	8

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Medford, NJ	Taunton Road & Tuckerton Road	1989	N	EX 4S 014365 - 14397	10
Medford, NJ	None Listed	1989	N	EX 4S 013878 - 14884	10
Mendham, NJ	East Main Street (Route 24) & Orchard Street	1989	Y	EX 4S 000865 - 970	1
Mendham, NJ	Main Street & Orchard	1983	Y	EX 4S 011317 - 11341	7
Mercerville, NJ	None Listed	1988	Y	EX 4S 011153 - 11228	7
Millburn, NJ	345 Essex Street	1990	N	EX 4S 005295 - 5313	3
Millburn, NJ	26 Main Street		N	EX 4S 013584	9
Monmouth Junction, NJ	Route 1 & New Road	1990	N	EX 4S 001063 - 1071	1
Monmouth Junction, NJ	New Road and U.S. Route 1	1988	N	EX 4S 002895 - 2899	2
Monmouth Junction, NJ	New Road and U.S. Route 1	1988	Y	EX 4S 002900 - 2950	2
Monmouth Junction, NJ	Route 1 and New Road	1988	N	EX 4S 013958 - 14975	10
Montclair, NJ	264 Bloomfields Avenue	1989	N	EX 4S 010513 - 10520	7
Morganville, NJ	Route 9 North & Texas Road	1983	N	EX 4S 001708 - 1738	1
Morganville, NJ	Route 9 & Texas Road	1989	Y	EX 4S 014085 - 14198	10
Mount Holly, NJ	Route 38 & Lumberton Road	1987	N	EX 4S 000404 - 439	1
Mount Holly, NJ	Route 571 & Woodlane Road	1988	Y	EX 4S 002319 - 2340	1
Mount Holly, NJ	None Listed	1988	N	EX 4S 013864 - 869	10
Mount Laurel, NJ	Route 73 & Church Road	1983	N	EX 4S 010213 - 10228	7
Mount Laurel, NJ	New Jersey Turnpike James F. Cooper Service Area 4N	1989	N	EX 4S 010875 - 10886	7
Mount Laurel, NJ	Rte 73 & Church Road	1989	Y	EX 4S 012987 - 13062	8
Neptune City, NJ	Sylvania & Brighton Avenues	None Listed	N	EX 4S 012042 - 12044	8
Neptune City, NJ	Sylvania & Brighton Avenues	1990	Y	EX 4S 012795 - 12848	8
Neptune, NJ	Route 33 & Route 35	1989	N	EX 4S 010719 - 10723	7
Neptune, NJ	Rtes 33 & 35	1991	N	EX 4S 012435 - 12465	8
Neptune, NJ	Route 35 & Corlies Avenue	1990	N	EX 4S 014020 - 14038	10
Neptune, NJ	Sylvania & Brighton Avenues	1989	N	EX 4S 014012 - 14019	10
New Brunswick, NJ	Commercial Avenue and George Street	1991	Y	EX 4S 005314 - 5357	3
New Brunswick, NJ	163 George Street	1990	Y	EX 4S 005358 - 5362	3
New Brunswick, NJ	New Jersey Turnpike Service Areas	1988	N	EX 4S 009271 - 9327	6
New Brunswick, NJ	New Jersey Turnpike Service Area	1988	N	EX 4S 010074 - 10078	6
Newark, NJ	1129 South Orange Avenue	1989	Y	EX 4S 001199 - 1212	1
Newark, NJ	263 Heller Parkway	1990	Y	EX 4S 005077 - 5169	3
Newark, NJ	387 Springfield Avenue	1989	Y	EX 4S 005613 - 5640	3
Newark, NJ	None Listed	1989	N	EX 4S 010165 - 10173	7
Newark, NJ	1129 South Orange Avenue	1989	N	EX 4S 010521 - 10547	7
Newark, NJ	625 McCarter Highway	1990	N	EX 4S 013373 - 13400	9
None Listed	Woodrow Wilson Service Area	1991	N	EX 4S 011637 - 11781	8
None Listed	Woodrow Wilson Service Area	1989	N	EX 4S 012592 - 12613	8
North Bergen, NJ	8133 Bergenline Avenue	1988	Y	EX 4S 010340 - 10349	7
North Bergen, NJ	8133 Bergenline Avenue	1997	N	EX 4S 012045 - 12049	8

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North Caldwell, NJ	Grandview Avenue and Fairfield Road	1988	Y	EX 4S 005719 - 5823	3
North Cape May, NJ	3731 Bayshore Road	1989	N	EX 4S 010941 - 10944	7
North Cape May, NJ	3731 Bayshore & Town Bank Rd.	1989	Y	EX 4S 012899 - 12986	8
North Monmouth, ME	Route 202	1990	Y	EX 4S 005379 - 5506	3
Northvale, NJ	264 Livingston Avenue	1989	Y	EX 4S 001943 - 2011	1
Northvale, NJ	264 Livingston Ave	1990	Y	EX 4S 011542 - 11593	8
Nutley, Essex County, NJ	259 Centre Street and Brookline Avenue	1990	Y	EX 4S 013411 - 13468	9
Oakhurst, NJ	Monmouth Road & Roosevelt Avenue	1990	N	EX 4S 001213 - 1227	1
Oakhurst, NJ	203 Monmouth Road	1990	N	EX 4S 010977 - 10982	7
Oakhurst, NJ	203 Monmouth Road	1990	N	EX 4S 011046 - 11047	7
Ocean City, NJ	9th Street & Bay Ave.	1989	Y	EX 4S 009357 - 9369	6
Ocean City, NJ	9th Street & Bay Avenue	1989	Y	EX 4S 011342 - 11370	7
Ocean City, NJ	None Listed	1986	N	EX 4S 012668 - 12688	8
Ocean City, NJ	None Listed	1986	N	EX 4S 012722 - 12743	8
Ocean County, NJ	None Listed	1985	N	EX 4S 003859 - 3862	2
Old Bridge, NJ	2203 Route 9	1988	Y	EX 4S 002831 - 2888	2
Old Bridge, NJ	2203 Route 9	1989	N	EX 4S 002889 - 2894	2
Old Bridge, NJ	Route 9 and Perrine Rd.	1990	N	EX 4S 003716 - 3787	2
Old Bridge, NJ	Route 9	1988	Y	EX 4S 010801 - 10841	7
Old Bridge, NJ	Route 9 North & Arcadia Lane	1988	N	EX 4S 011074 - 11090	7
Orange, NJ	Essex Avenue & Freeway Drive West	1990	Y	EX 4S 011378 - 11391	7
Orange, NJ	Essex Ave & Freeway Dr. W.	1999	N	EX 4S 012269 - 12273	8
Paulsboro, NJ	None Listed	1995	N	EX 4S 012274 - 12413	8
Paw Creek, NC	None Listed	1990	N	EX 4S 010870 - 10874	7
Pennsauken, NJ	Mapple Avenue and Haddonfield Road	1991	Y	EX 4S 013633 - 13636	9
Pequannock, NJ	None Listed	1989	Y	EX 4S 004204 - 4238	2
Petaluma, CA	532 East Washington Street	1997	N	EX 4S 013539 - 13569	9
Point Pleasant, NJ	Route 88 & Bay Ave.	1988	N	EX 4S 010063 - 10066	6
Point Pleasant, NJ	Route 88 and Bay Ave.	1990	Y	EX 4S 014199 - 14305	10
Pomona, NJ	2032 White Horse Pike	1991	Y	EX 4X 006175 - 6202	3
Pomona, NJ		1990	N	EX 4S 006204 - 6206	4
Pomona, NJ	2032 White Horse Pike	1989	Y	EX 4S 007803 - 7930	5
Pomona, NJ	2032 White Horse Pike	1987	Y	EX 4S 013780 - 13862	9
Portland, ME	Brighton Ave. at Riverside St.	1986	N	EX 4S 004799 - 4827	2
Princeton, NJ	3713 Brunswick Pike	1987	N	EX 4S 014464 - 14484	10
Princeton, NJ	None Listed	1989	N	EX 4S 013885 - 14890	10
Raleigh, NC	600 West Peace Street	1989	N	EX 4S 008024 - 8076	5
Raleigh, NC	2601 Glenwood Avenue	1990	N	EX 4S 008077 - 8108	5
Red Bank, NJ	Route 520 & Shrewsbury Avenue	1990	N	EX 4S 000971 - 982	1
Red Bank, NJ	None Listed	1990	Y	EX 4S 002690 - 2734	2
Red Bank, NJ	Route 35 and Rector Place	1990	N	EX 4S 002735 - 2738	2
Red Bank, NJ	Route 35 & Rector Place	1990	N	EX 4S 009339 - 9344	6
Ridgefield, NJ	Vincent Lombardi Service Plaza	1988		EX 4S 014485 - 14511	10

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Ridgewood, NJ	260 Franklin Avenue	1990	Y	EX 4S 002341 - 2366	1
Ridgewood, NJ	260 Franklin Ave.	1989	N	EX 4S 009354 - 9356	6
Ridgewood, NJ	260 Franklin Avenue	1989	N	EX 4S 010369 - 10375	7
Ridgewood, NJ	260 Franklin Avenue	1989	Y	EX 4S 010505 - 10512	7
Ringwood, NJ	60 Skyline Drive	1990	Y	EX 4S 010407 - 10409	7
Ringwood, NJ	60 Skyline Drive	1990	N	EX 4S 011229 - 11248	7
Rio Grande, NJ	Routes 9 & 47	1988	N	EX 4S 010945 - 10952	7
Rio Grande, NJ	Route 47 & Route 9	1987	Y	EX 4S 014512 - 14542	10
River Edge, NJ	2 Route No. 4 Westbound	1990	Y	EX 4S 009526 - 9544	6
Rochelle Park, NJ	Route 17 North	1989	Y	EX 4S 004003 - 4090	2
Rockaway, NJ	None Listed	circa 1984	Y	EX 4S 010447 - 10504	7
Roseland, NJ	Eisenhower Pkwy. & Eagle Rock Rd.	1988	Y	EX 4S 009445 - 9482	6
Roseland, NJ	550 Eagle Rock Avenue	1996	N	EX 4S 011782 - 11784	8
Roselle Park, NJ	Rte 28 & Filbert Ave.	1989	Y	EX 4S 011832 - 11853	8
Runnemede, NJ	Routes 168 & 41	1988	N	EX 4S 009690 - 9693	6
Runnemede, NJ	Black Horse Pike & Clements Bridge Rd.	1988	Y	EX 4S 009708 - 9802	6
Saddle River, NJ	31 Woodcliff Lake Road	1989	Y	EX 4S 000440 - 535	1
Saddle River, NJ	31 Woodcliff Lake Rd.	1989	Y	EX 4S 009694 - 9706	6
San Francisco, CA	N/A	1999	N	EX 4S 002474	3
San Francisco, CA	N/A	1999	N	EX 4S 000476	3
San Francisco, CA	3445 Geary Boulevard	1997	N	EX 4S 013570 - 13577	9
Sanford, NC	307 Carthage Street	1990	N	EX 4S 009193 - 9236	5
Sanford, NC	307 Carthage Street	1989	N	EX 4S 009262 - 9269	5
Sayreville, NJ	350 Main Street	1991	Y	EX 4S 005221 - 5259	3
Sayreville, NJ	350 Main Street	1990	N	EX 4S 010385 - 10394	7
Scotch Plains, NJ	2360 South Avenue	1987	Y	EX 4S 006540 - 6609	4
Sea Isle City, NJ	4400 Landis Ave.	1989	Y	EX 4S 003570 - 3669	2
Sea Isle City, NJ	4400 Landis Avenue	1989	Y	EX 4S 010365 - 10368	7
Sea Isle City, NJ	44th Street & Landis Avenue	1989	N	EX 4S 010902 - 10914	7
Secaucus, NJ	Service Area 12S and Maintenance District 6	1995	N	EX 4S 011899 - 11906	8
Shrewsbury, NJ	479 Broad Street (Route 35)	1984	N	EX 4S 010861 - 10869	7
Shrewsbury, NJ	479 Broad Street	None Listed	N	EX 4S 012015 - 12019	8
Sicklerville, NJ	Route 42 & Cross Keys Rd.	1989	Y	EX 4S 004461 - 4557	2
Sicklerville, NJ	Route 42 & Cross Keys Rd.	1990	Y	EX 4S 004558 - 4568	2
Sicklerville, NJ	Route 42 & Cross Keys Rd.	1990	N	EX 4S 004868 - 4875	2
Skyland, NC	U.S. Highway 25 and U.S. Highway 280	1990	N	EX 4S 006353 - 6372	4
Somerville, NJ	Union & Roosevelt Avenues	1989	Y	EX 4S 001739 - 1803	1
Somerville, NJ	Route 206 & Somerset St.	1988	N	EX 4S 010067 - 10073	6
Somerville, NJ	Route 206 & Somerset Street	1988	Y	EX 4S 010983 - 11042	7
Somerville, NJ	1 Union Avenue	1989	N	EX 4S 013945 - 14949	10
South Bound Brook, NJ	267 Main Street	1989	Y	EX 4S 006979 - 7102	4
South Orange, NJ	Irvington Ave. & Waverly Dr.	1990	N	EX 4S 009493 - 9500	6
South Orange, NJ	Irvington Avenue & Waverly Drive	1990	N	EX 4S 010258 - 10339	7
Springfield, NJ	500 Campus Drive P.O. Box 451	1990	N	EX 4S 005641 - 5663	3

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Springfield, NJ	None Listed	1990	Y	EX 4S 009545 - 9599	6
Springfield, NJ	Morris Ave. & Caldwell Pl.	1990	Y	EX 4S 011882 - 11890	8
Stockton, NJ	Bridge & Railroad Streets	1988	Y	EX 4S 004569 - 4672	2
Stratford, NJ	Route 30 and Laurel Ave.	1986	N	EX 4S 002739 - 2742	2
Stratford, NJ	Route 30 and Laurel Ave.	1989	Y	EX 4S 002743 - 2830	2
Stratford, NJ	Route 30 & Laurel Rd.	1986	N	EX 4S 009867 - 9883	6
Stratford, NJ	Route 30 & Laurel Road	1986	N	EX 4S 010922 - 10929	7
Succasunna, NJ	108 Route 10 West & South Street	1989	Y	EX 4S 001072 - 1104	1
Succasunna, NJ	108 Rte 10 & South St.	1990	Y	EX 4S 011810 - 11821	8
Summit, NJ	36 River Road	1989	Y	EX 4S 000715 - 864	1
Summit, NJ	Morris & Springfield Aves.	1988	Y	EX 4S 002951 - 2988	2
Summit, NJ	795 Old Springfield Ave.	1990	Y	EX 4S 009600 - 9646	6
Summit, NJ	795 Old Springfield Rd.	1997	N	EX 4S 011822 - 11826	8
Teaneck, NJ	468 Teaneck Road	1990	N	EX 4S 000152 - 158	1
Teaneck, NJ	215 Teaneck Rd.	1990	N	EX 4S 009381 - 9396	6
Teaneck, NJ	Teaneck Road & Oakdene Ave.	1990	N	EX 4S 014072 - 14084	10
Tenafly, NJ	County Rd. & Jay St.	1998	N	EX 4S 011594 - 11600	8
Toms River, NJ	Hooper Avenue & Church Road	1985	Y	EX 4S 001277 - 1397	1
Trenton, NJ	144 Sanhican Drive	1989	Y	EX 4S 002367 - 2403	1
Trenton, NJ	Route 31 & Olden Ave.	1989	Y	EX 4S 009803 - 9851	6
Trenton, NJ	144 Sanhican Drive	1989	N	EX 4S 011064 - 11066	7
Union County	William Halsey Service Area 11N	1992	N	EX 4S 011907 - 11926	8
Union, NJ	2449 1/2 Morris Ave.	1999	N	EX 4S 011827 - 11831	8
Upper Montclair, NJ	572 Valley Road	1988	N	EX 4S 011264 - 11269	7
Upper Montclair, NJ	572 Valley Road	1990	N	EX 4S 011371 - 11377	7
Upper Montclair, NJ	None Listed	1999	N	EX 4S 012264 - 12268	8
Ventnor, NJ	317-319 Dorset Avenue	1989	Y	EX 4S 005934 - 5947	3
Vernon, NJ	None Listed	1990	Y	EX 4S 007745 - 7772	5
Vineland, NJ	Route 47 & Park Ave.	1988	Y	EX 4S 009409 - 9433	6
Vineland, NJ	Route 47 North & Park Avenue	1988	N	EX 4S 010930 - 10940	7
Vista, CA	210 South Melrose Drive	1988	N	EX 4S 013578 - 13583	9
Waldwick, NJ	137 Franklin Turnpike	1990	Y	EX 4S 004970 - 4994	3
Waldwick, NJ	137 Franklin Turnpike	1991	Y	EX 4S 004995 - 5076	3
Wayne, NJ	Paterson - Hamburg Turnpike & Ratzer Rd.	1990	N	EX 4S 003198 - 3225	2
Wayne, NJ	63 Rt. 23 South	1990	Y	EX 4S 006207 - 6271	4
Wayne, NJ	Paterson-Hamburg Tpke & Ratzer Road	1994	N	EX 4S 012514 - 12522	8
Weehawken, NJ	2816 Palisades Ave.	1988	Y	EX 4S 002475 - 2512	2
Weehawken, NJ	979 Boulevard East	1988	Y	EX 4S 006315 - 6352	4
Weehawkin, NJ	None Listed	1989	Y	EX 4S 010766 - 10766	7
Weehawkin, NJ	1836 Park Avenue	1990	Y	EX 4S 011927 - 11939	8
Weehawkin, NJ	1836 Park Avenue	1997	N		
West New York, NJ	165 60th Street	1985	Y	EX 4S 003254 - 3286	2
West New York, NJ	165 60th Street	1997	N	EX 4S 012009 - 12014	8
West Trenton, NJ	53 Grand Avenue	1990	Y	EX 4S 002038 - 2124	1
Westfield, NJ	421 Central Avenue	1990	N	EX 4S 011249 - 11251	7

South Tahoe PUD Litigation
Exxon Site/MTBE Mitigation

Location	Address	Year	Anderson Document(s) (Y/N)	Bates Range	Box No.
Whippany, NJ	Route 10 East	1989	Y	EX 4S 004717 - 4783	2
Whitehouse Station, NJ	Route 22 West Oldwick Road	1990	Y	EX 4S 001671 - 1707	1
Whitehouse Station, NJ	Route 22 West	1990	N	EX 4S 011053 - 11057	7
Wildwood, NJ	5th & New Jersey Avenues	1989	N	EX 4S 010915 - 10921	7
Wildwood, NJ	Rio Grande Ave. & Park Blvd.	1987	Y	EX 4S 014543 - 14649	10
Wilmington, NC	3502 Oleander Drive	1989	N	EX 4S 003962 - 4002	2
Wilmington, NC	2606 Carolina Beach Rd.	1989	N	EX 4S 004091 - 4143	2
Wilmington, NC	2606 Carolina Beach Rd.	1989	N	EX 4S 004144 - 4193	2
Wilmington, NC	2606 Carolina Beach Rd.	1989	N	EX 4S 004194 - 4203	2
Wilmington, NC	315 Wooster Street	1996	N	EX 4S 013637 - 13639	9
Wilmington, NC	315 Wooster Street	1995	N	EX 4S 013642 - 13647	9
Winston-Salem, NC	4996 Country Club Road	1996	N	EX 4S 008235 - 8264	5
Woodbridge, NJ	Thomas Edison Service Area 10S	1992	N	EX 4S 012864 - 12898	8
				EX 4S 012476 - 12493	8

Exhibit 11

<p>1 SUPERIOR COURT OF THE STATE OF CALIFORNIA IN AND FOR THE COUNTY OF SAN FRANCISCO</p> <p>2 SOUTH TAHOE PUBLIC UTILITY *</p> <p>3 DISTRICT, *</p> <p>Plaintiff *</p> <p>4 VS. * NO. 999128</p> <p>5 ATLANTIC RICHFIELD COMPANY ("ARCO"); *</p> <p>6 ARCO CHEMICAL COMPANY; SHELL OIL *</p> <p>COMPANY; CHEVRON U.S.A., INC.; *</p> <p>7 EXXON CORPORATION; B.P. AMERICA, *</p> <p>8 INC.; TOSCO CORPORATION; ULTRAMAR, *</p> <p>9 INC.; BEACON OIL CO.; USA *</p> <p>10 GASOLINE CORPORATION; et al., *</p> <p>11 Defendants *</p> <p>12</p> <p>13 *****</p> <p>14 VIDEOTAPED DEPOSITION OF</p> <p>15 JACK E. SPELL</p> <p>16 April 13, 2000</p> <p>17 *****</p> <p>18</p> <p>19 VIDEOTAPED DEPOSITION OF JACK E. SPELL, produced as</p> <p>20 a witness at the instance of the plaintiff, was taken in</p> <p>21 the above styled and numbered cause on April 13, 2000,</p> <p>22 from 10:02 a.m. to 3:18 p.m., before Kay Howell,</p> <p>23 Certified Shorthand Reporter in and for the State of</p> <p>24 Texas, reported by machine shorthand, at 4300 Scotland,</p> <p>25 Houston, Texas.</p>	<p style="text-align: right;">Page 3</p> <p>1 INDEX</p> <p>2 Page/Line</p> <p>Examination by Mr. Miller 5 24</p> <p>3 Videotape No. 2 79 15</p> <p>4 Examination by Mr. Wallis 103 9</p> <p>5 Further examination by Mr. Miller 109 23</p> <p>6 Changes and Witness Signature Page 117 1</p> <p>7 Reporter's Certification 119 1</p> <p>8</p> <p>9</p> <p>10</p> <p>11 EXHIBITS</p> <p>12 No. Description Page/Line</p> <p>13 1 Notice of deposition 9 5</p> <p>14 2 Memo dated April 3, 1984, from J. E. 9 13</p> <p>Spell to J. S. Dick re use of MTBE in</p> <p>15 Exxon Mogas</p> <p>16 3 Memo dated March 20, 1984, from J. E. 18 5</p> <p>Spell to R. T. Peters re use of MTBE in</p> <p>17 Exxon mogas</p> <p>18 4 Memo dated June 8, 1984, from J. E. 23 5</p> <p>Spell to J. S. Dick re ground water</p> <p>19 contamination with oxygenates</p> <p>20 5 Memo dated June 11, 1984, from J. E. 35 12</p> <p>Spell to J. S. Dick re ground water</p> <p>21 contamination with oxygenates</p> <p>22 6 Memo dated 7-10-84 from Jack Spell to 40 24</p> <p>R. T. Peters</p> <p>23</p> <p>24 7 Memo dated July 17, 1984, from J. E. 42 19</p> <p>Spell to John Olsen re MTBE usage in</p> <p>25 mogas at Brownsville, Texas terminal</p>
<p style="text-align: right;">Page 2</p> <p>1 A P P E A R A N C E S:</p> <p>2</p> <p>FOR PLAINTIFF:</p> <p>3 Mr. Duane C. Miller</p> <p>Ms. Tamarin Austin</p> <p>4 Miller, Sher & Sawyer</p> <p>100 Howe Avenue, Suite S120</p> <p>5 Sacramento, California 95825-8218</p> <p>6</p> <p>FOR DEFENDANT ARCO CHEMICAL COMPANY:</p> <p>7 Mr. Jay E. Smith</p> <p>Step toe & Johnson, L.L.P.</p> <p>8 633 West Fifth Street, Suite 700</p> <p>Los Angeles, California 90071</p> <p>9</p> <p>10 FOR DEFENDANT EXXON CORPORATION:</p> <p>Mr. Robert B. Wallis</p> <p>11 Exxon Mobil Corporation</p> <p>P.O. Box 2180</p> <p>12 Houston, Texas 77252-2180</p> <p>13</p> <p>FOR DEFENDANT TERRIBLE HERPST, INC.:</p> <p>14 Mr. J. Terry Schwartz</p> <p>Price, Postel & Parma, L.L.P.</p> <p>15 200 East Carrillo Street, Suite 400</p> <p>Santa Barbara, California 93101</p> <p>16</p> <p>17 VIDEOGRAPHER:</p> <p>Ms. Suzy Price</p> <p>18 P.O. Box 1433</p> <p>Alvin, Texas 77512-1433</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: right;">Page 4</p> <p>1 8 Memo dated March 21, 1985, from J. E. 45 12</p> <p>Spell to C. B. Raglin re Exxon Extra</p> <p>2 unleaded gasoline</p> <p>3 9 Memo dated August 23, 1984, from B. J. ... 63 4</p> <p>Mickelson to V. M. Dugan re MTBE</p> <p>4 contamination of ground water</p> <p>5 10 Memo dated February 22, 1985, from B. 63 14</p> <p>J. Mickelson to J.M.E. Mixer re methyl</p> <p>6 tertiary butyl ether (MTBE)</p> <p>7 11 Memo dated April 19, 1985, from B. J. 64 2</p> <p>Mickelson to J.M.M. Mixer re</p> <p>8 introduction of MTBE in the Texas</p> <p>Eastern Transmission</p> <p>9</p> <p>12 MTBE introduction responsibilities 73 18</p> <p>10</p> <p>13 Memo dated June 25, 1985, from R. P. 76 16</p> <p>Larkins to E. J. Hess</p> <p>11 14 Article entitled "Removing Organics 89 8</p> <p>From Groundwater Through Aeration Plus</p> <p>12 GAC" by McKinnon and Dyksen</p> <p>13 15 Article entitled "MTBE as a Ground 90 1</p> <p>Water Contaminant" by Garrett, Moreau,</p> <p>14 and Lowry</p> <p>15 16 Methyl Tertiary Butyl Ether (MTBE): 90 16</p> <p>I.H. Information for OEL Development</p> <p>16</p> <p>17 Handwritten note from JSS dated 1-7-87 ... 91 23</p> <p>18 with memo attached</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>

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1 THE VIDEOGRAPHER: This is the video
2 deposition of Mr. Jack E. Spell. Today's date is April
3 13, year 2000. The approximate time is 10:02 a.m. The
4 style of the case is South Tahoe Public Utility District
5 vs. Atlantic Richfield. The deposition is now taking
6 place at 4300 Scotland in Houston, Texas. If counsel
7 present will please identify yourselves for the record,
8 and then we will have the court reporter swear the
9 witness.

10 MR. MILLER: Good morning, Mr. Spell. My
11 name is Duane Miller. I represent the South Tahoe Public
12 Utility District, and I'm going to be taking your
13 deposition this morning.

14 MR. WALLIS: I'm Robert Wallis. I
15 represent Mr. Spell and Exxon Corporation.

16 MR. SMITH: I'm Jay Smith with Steptoe &
17 Johnson representing Arco Chemical Company.

18 MR. SCHWARTZ: Terry Schwartz with Price,
19 Postel & Parma for Terrible Herpst, Inc.

20 JACK E. SPELL

21 having been first duly sworn, testified as follows:

22 EXAMINATION

23 BY MR. MILLER:

24 Q. Could you give us your name and current address,
25 please?

Page 6

1 A. My name is Jack E. Spell. Current address is
2 3434 Ella Lee Lane, Houston 77027.

3 Q. I understand, Mr. Spell, that you were employed
4 by Exxon for a number of years. Is that correct?

5 A. That's correct.

6 Q. And that you're currently retired?

7 A. That's correct.

8 Q. Could you tell us approximately how long you
9 worked for them?

10 A. 37 years.

11 Q. I don't know that I need your entire employment
12 history, but if you could tell us your principal work
13 that you did for Exxon so that we would have a basic
14 understanding of your background?

15 A. Okay. I began work with Exxon very shortly after
16 graduation from college in 1955. I went on a two and a
17 half year assignment with the Air Force after having
18 worked for two months. Came back to Exxon, which was
19 then Humble Oil & Refining Company at its Baytown, Texas,
20 refinery as a chemical engineer. Worked in that position
21 for approximately two years before transferring to
22 Exxon's marketing department in Houston, Texas, in an
23 organizational group that was known as sales engineering
24 at that time.

25 The name of that group was subsequently changed

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1 to marketing technical services, I think maybe late 60's
2 or 1970, somewhere along in there. This marketing
3 technical services organization had responsibilities
4 within the marketing department for product quality.
5 Each of the people within the organization had certain
6 products for which they were responsible. My
7 responsibilities were primarily motor gasoline. I worked
8 in that organization pretty much throughout my career
9 with the exception of a period between 1974 and 1981, at
10 which time I was a part of marketing department's
11 regulatory affairs organization. That was involved with
12 the compliance by Exxon of the mandatory price and
13 allocation regulations on petroleum products.
14 After the products were decontrolled in I believe
15 it was 1981, I moved back into the marketing technical
16 services organization, still with motor gasoline as my
17 primary responsibility, and worked in that group until my
18 retirement in 1992.

19 Q. Where did you attend college?

20 A. Texas A & M, or at the time I graduated it was
21 known as the Agricultural and Mechanical College of
22 Texas. The name has subsequently been changed to Texas A
23 & M University.

24 Q. And what was your degree in?

25 A. In chemical engineering. It was a B.S. in

Page 8

1 chemical engineering.

2 Q. Did you go on to take any graduate level courses?

3 A. I did not.

4 Q. Basically in chemical engineering, what do you
5 do? Give us a short description.

6 A. The chemical engineer is responsible for process
7 design of the particular chemical operations that are
8 being conducted in a particular plant. In my case, this
9 was petroleum refinery. And I was primarily associated
10 with distillation units within the refinery and trying to
11 optimize their operation and to make improvements in
12 their operation from a chemical or an operating condition
13 standpoint.

14 Q. During your career with Exxon, did you come to
15 know a chemical that is included in gasoline called MTBE?

16 A. Yes, I did.

17 Q. And were you associated with a decision to add
18 MTBE to Exxon gasoline, sir?

19 A. Associated, yes, as part of my marketing
20 technical services responsibilities to recommend to
21 marketing department management what the technical
22 aspects were of the inclusion of MTBE in motor gasoline,
23 its advantages and/or disadvantages.

24 Q. And as a part of your work during the period of
25 time that a decision was being made on whether or not to

<p style="text-align: right;">Page 13</p> <p>1 water systems of a gasoline component that is soluble in 2 water to a much greater extent; (2) potential necessity 3 of treating water bottoms as a 'hazardous waste'; and (3) 4 delivery of a fuel to our customers that potentially may 5 provide poorer fuel economy, and (4) potential effects on 6 U.S. petroleum self-sufficiency and balance of payments 7 position." That was your statement at the time, is that 8 correct?</p> <p>9 A. That's correct.</p> <p>10 Q. I would like to go over these.</p> <p>11 A. Okay.</p> <p>12 Q. At the time Exxon had a refinery in Texas, where 13 you were considering adding MTBE to the gasoline, is that 14 correct?</p> <p>15 A. Possibly so. My memory is not really good enough 16 at this point to know whether we were actually 17 considering it at that time or not.</p> <p>18 Q. Okay. Well, we may provide you with documents 19 later that will assist on you that.</p> <p>20 A. Okay.</p> <p>21 Q. We'll see. But in any event, Exxon was actively 22 considering adding MTBE to its gasoline. That's the 23 subject of this memo, is that correct?</p> <p>24 A. Yes.</p> <p>25 Q. And you discuss concerns with service station</p>	<p style="text-align: right;">Page 15</p> <p>1 Q. And it takes time to do that. Is that your 2 understanding?</p> <p>3 A. I really have no knowledge on how long it would 4 take. I would think it would be relatively quickly that 5 it would reach an equilibrium to the maximum extent of 6 solubility.</p> <p>7 <u>Q. Okay. And it was your understanding back in 1984</u> 8 <u>when you wrote this document that MTBE was different than</u> 9 <u>that. It was much more soluble in water than the other</u> 10 <u>components of gasoline. Is that correct?</u></p> <p>11 <u>A. Yes.</u></p> <p>12 <u>Q. Now, what that did, of course, is it created a</u> 13 <u>potential to contaminate ground water. That's what you</u> 14 <u>were referencing here when you talked about leaks from</u> 15 <u>service station tanks, quote, into underground water</u> 16 <u>systems?</u></p> <p>17 <u>A. Yes.</u></p> <p>18 <u>Q. Now, was it understood at the time that that</u> 19 <u>might, for example, contaminate somebody's well?</u></p> <p>20 <u>A. If a leak were to occur, yes. Using the word</u> 21 <u>contaminate, yes, some of the material that leaked from</u> 22 <u>the tank could find its way into someone's water well.</u></p> <p>23 <u>Q. Okay. And you state in this memo "We have</u> 24 <u>ethical and environmental concerns." Was that one of the</u> 25 <u>environmental concerns that you had at the time; that is</u></p>
<p style="text-align: right;">Page 14</p> <p>1 tanks leaking "a gasoline component that is soluble in 2 water to a much greater extent." Could you explain what 3 you meant by that, please?</p> <p>4 A. Well, up until this point, Exxon had been 5 marketing only hydrocarbon only gasolines. That is to 6 say, no oxygenates had been added to the gasoline. 7 Hydrocarbons have very limited solubility in water to the 8 extent of perhaps 100 parts per million or so. The 9 oxygenates that were under consideration or that were 10 being used in the industry at that time had a much 11 greater solubility in water. And so what this is saying 12 is that any leakage of the gasoline with oxygenates out 13 of a service station, an underground service station 14 tank, would carry with it some material such as the 15 oxygenate that is soluble in water. And could -- we 16 would have some concern about that.</p> <p>17 Q. Okay. Let's go back to hydrocarbon only gasoline 18 that doesn't contain oxygenates.</p> <p>19 A. Okay.</p> <p>20 Q. As a chemical engineer, you know, of course, that 21 if you have gasoline and water, they will tend to remain 22 separate, and gasoline will literally float on top of the 23 water. Is that correct?</p> <p>24 A. Essentially correct. There is a small part of 25 the gasoline that will dissolve itself in water.</p>	<p style="text-align: right;">Page 16</p> <p>1 <u>leakage of service station tanks into underground water?</u></p> <p>2 <u>A. Yes, it would be.</u></p> <p>3 Q. You also go on to indicate there were some other 4 problems. One of them is, on the next page, the 5 potential to provide poor fuel economy. What did you 6 mean by that, please?</p> <p>7 A. Gasoline containing oxygenate has a lower heat 8 content than does a hydrocarbon only gasoline. Thus the 9 fuel economy a person would experience from using an 10 oxygenated gasoline directionally is lower than for using 11 a hydrocarbon only gasoline.</p> <p>12 Q. Basically what that translates into is that you 13 have to fill up the tank a little bit more often?</p> <p>14 A. Right.</p> <p>15 Q. Okay. The note at the top from one of the 16 recipients of this document that you identified earlier 17 was Mr. Davidson?</p> <p>18 A. No, Dugan.</p> <p>19 Q. I'm sorry. Dugan. He states, "Haven't you built 20 MTBE use into your projections? If so, shouldn't we 21 initiate JES's proposed study now?"</p> <p>22 A. Uh-huh.</p> <p>23 Q. The JES -- in many of these documents you're 24 listed as J. E. Spell. Correct?</p> <p>25 A. That's correct.</p>

<p style="text-align: right;">Page 17</p> <p>1 Q. And you were proposing some study apparently.</p> <p>2 What study were you thinking of at the time?</p> <p>3 A. I don't really know. I don't recall.</p> <p>4 Q. It may help to go to the last paragraph. <u>Could</u></p> <p>5 <u>you read your handwriting for us, please?</u></p> <p>6 A. Okay. Let's see. <u>"Therefore, at such time as</u></p> <p>7 <u>refining begins to see strong economic incentives to use</u></p> <p>8 <u>MTBE, a study should be started thoroughly review the</u></p> <p>9 <u>issue with management. Consequently, I have used not</u></p> <p>10 <u>previously -- not precisely stated in defining the lead</u></p> <p>11 <u>time for initiation of the use of MTBE at Exxon</u></p> <p>12 <u>refineries."</u></p> <p>13 Q. Basically you were saying a study needed to be</p> <p>14 done before a decision was made on whether to use this?</p> <p>15 A. Yes.</p> <p>16 Q. And that was your recommendation at the time?</p> <p>17 A. Yes.</p> <p>18 Q. What were you referring to when you said, "At</p> <p>19 such time as refining begins to see strong economic</p> <p>20 incentives to use MTBE that the study should be done"?</p> <p>21 A. The use of MTBE -- MTBE itself was a relatively</p> <p>22 high octane material. So thus it may have some economic</p> <p>23 incentives for our refiners to use MTBE as a blending</p> <p>24 component and thus reduce the cost of the gasoline being</p> <p>25 produced.</p>	<p style="text-align: right;">Page 19</p> <p>1 production and movement of gasoline supplies.</p> <p>2 Q. Okay. In the document to Mr. Peters you write on</p> <p>3 the first page "However," -- this is midway. "It is my</p> <p>4 understanding that an agreement exists between refining</p> <p>5 and marketing that MTBE would not be intentionally added</p> <p>6 to any of these three grades," listing grades of</p> <p>7 gasoline, "at any concentration without," first point,</p> <p>8 first marketing -- "first advising marketing of the</p> <p>9 intention to do so and subsequently allowing marketing</p> <p>10 adequate time to prepare the distribution system, and,"</p> <p>11 second point, "The intention of continuous use by</p> <p>12 refining i.e., there would be no on-again, off-again use</p> <p>13 of MTBE."</p> <p>14 Do you see that statement?</p> <p>15 A. Yes, I do.</p> <p>16 Q. And then somebody wrote a comment in the margin.</p> <p>17 Could you read that for us?</p> <p>18 A. It looks like it says: How about marketing -- I</p> <p>19 think that may be management agreement.</p> <p>20 Q. And some questions marks?</p> <p>21 A. Yes.</p> <p>22 Q. Is that your note or someone else's note?</p> <p>23 A. It is not my handwriting. It looks very similar</p> <p>24 to J. S. Dick's handwriting, and I do see that he was --</p> <p>25 he did receive a CC of this letter.</p>
<p style="text-align: right;">Page 18</p> <p>1 Q. I see. <u>Was it your understanding that at some</u></p> <p>2 <u>point refining did see an economic incentive to use MTBE</u></p> <p>3 <u>at Exxon?</u></p> <p>4 A. Yes.</p> <p>5 Q. I'd like to turn to Exhibit 3, please. This is</p> <p>6 another document about the same time frame. It's dated</p> <p>7 just prior to the document we went over. This time</p> <p>8 apparently you had time to have an assistant type this up</p> <p>9 for you.</p> <p>10 A. Yes, right.</p> <p>11 Q. But you did manage to find the time to sign it,</p> <p>12 correct?</p> <p>13 A. Oh, yes, I did.</p> <p>14 Q. That's your signature on the second page?</p> <p>15 A. It is.</p> <p>16 Q. And you sent this particular March 20, 1984,</p> <p>17 document to Mr. Peters, headquarters refining. What was</p> <p>18 Mr. Peters' first name? Here it's listed as R. T.</p> <p>19 Peters.</p> <p>20 A. Robert.</p> <p>21 Q. And what was his job in general at the time?</p> <p>22 A. His was a -- I guess kind of a coordination role</p> <p>23 within the headquarters refining organization. He worked</p> <p>24 with me in the marketing department quite a bit. I think</p> <p>25 he also worked with the supply department in coordinating</p>	<p style="text-align: right;">Page 20</p> <p>1 Q. In any event, you recognize this document in this</p> <p>2 form as an Exxon document, namely a letter you sent with</p> <p>3 some notes that were added by Exxon employees. Is that</p> <p>4 correct?</p> <p>5 A. That's correct.</p> <p>6 Q. Okay. What did you mean by the comment that if a</p> <p>7 decision was made to be -- to use MTBE, the use would be</p> <p>8 continuous. There would be no on-again off-again use?</p> <p>9 A. I think our concern there was that any fuel</p> <p>10 distribution system -- and in this case for these</p> <p>11 particular grades of gasoline would have been pipeline</p> <p>12 primarily -- pipeline deliveries within the State of</p> <p>13 Texas, that some deposits or rust perhaps or corrosion</p> <p>14 products may tend to build up in the distribution system.</p> <p>15 The introduction of gasoline containing a high</p> <p>16 concentration of MTBE with its greater solvency powers</p> <p>17 may tend to break loose these deposits and create a lot</p> <p>18 of particulate matter flowing through the system that</p> <p>19 would have to be filtered out before delivery to the</p> <p>20 customer. It may also contribute to some haze problems</p> <p>21 of water, so that the plan of attack would be to begin</p> <p>22 introducing MTBE containing gasolines at lower</p> <p>23 concentrations of MTBE initially and then build up the</p> <p>24 concentration over a period of time.</p> <p>25 Q. Okay. Was part of what you were saying here is</p>

<p style="text-align: right;">Page 25</p> <p>1 to confirm the information that's recited in the letter</p> <p>2 by having them do a scientific study, is that correct?</p> <p>3 A. Not necessarily do a study, but based on what</p> <p>4 information they had, they may have already done studies</p> <p>5 or researched the literature sufficiently that they could</p> <p>6 confirm the information that was being reported in here.</p> <p>7 Q. Okay. The handwritten note then goes on to</p> <p>8 state: If so, we need to advise management about the</p> <p>9 risk associated with MTBE. Correct?</p> <p>10 A. That's correct.</p> <p>11 Q. And that was a note to you by whom?</p> <p>12 A. I assume that that was Jim Dick's handwriting.</p> <p>13 Q. Given the way this is addressed; namely, your</p> <p>14 initials appear, this is a comment that would have come</p> <p>15 back to you after you wrote the letter?</p> <p>16 A. Yes. Apparently as was his practice, if he had</p> <p>17 some question or needed some additional information, he</p> <p>18 would just send his copy back to me with the question on</p> <p>19 it, and I would respond to him.</p> <p>20 Q. All right. Let's go to the text of the letter to</p> <p>21 find out what it was that you would need to advise</p> <p>22 management about. In the third full paragraph you</p> <p>23 state -- well, let's start at the beginning.</p> <p>24 A. Uh-huh.</p> <p>25 Q. In the first sentence of Exhibit 4, is it?</p>	<p style="text-align: right;">Page 27</p> <p>1 <u>water is the lower level of detectability for either MTBE</u></p> <p>2 <u>or IPE alone or a combination of the two. Sully</u></p> <p>3 <u>indicated that some simple experimentation around the</u></p> <p>4 <u>office had indicated that about 20 parts per billion MTBE</u></p> <p>5 <u>in water was the lower level of detectable odor." Is</u></p> <p>6 <u>that correct?</u></p> <p>7 A. That's correct.</p> <p>8 Q. Was that a correct summary at the time of what</p> <p>9 you learned by talking to Mr. Curran in June of 1984?</p> <p>10 A. I would certainly assume it was.</p> <p>11 Q. You wouldn't have any reason to advise your boss</p> <p>12 of something inaccurately at the time?</p> <p>13 A. That's certainly correct.</p> <p>14 Q. All right. Basically what you're saying here is</p> <p>15 that you had learned that Shell had a ground water</p> <p>16 contamination incident involving gasoline containing MTBE</p> <p>17 and this other substance, IPE. Is that correct?</p> <p>18 A. That's correct.</p> <p>19 Q. In your experience, is IPE also known as DIPE?</p> <p>20 A. I think -- yes, I think that's right.</p> <p>21 Diisopropyl ether.</p> <p>22 Q. Okay. And according to the information that you</p> <p>23 received from Mr. Curran, there were reports that levels</p> <p>24 as low as 5 parts per billion of MTBE in water had</p> <p>25 resulted in a detectable odor. Is that correct?</p>
<p style="text-align: right;">Page 26</p> <p>1 A. Yes.</p> <p>2 Q. <u>You state, "Sully Curran called today regarding</u></p> <p>3 <u>some additional information that he had obtained from</u></p> <p>4 <u>Shell Oil's environmental people on potential ground</u></p> <p>5 <u>water contamination problems with the use of oxygenates</u></p> <p>6 <u>in motor gasoline." Correct?</u></p> <p>7 A. That's correct.</p> <p>8 Q. <u>This letter would have been written shortly after</u></p> <p>9 <u>you spoke to Mr. Sully Curran who was an Exxon employee.</u></p> <p>10 <u>is that correct?</u></p> <p>11 A. I would assume that to be correct.</p> <p>12 Q. <u>And basically you were passing on information</u></p> <p>13 <u>that you had received from Mr. Curran to Mr. Dick?</u></p> <p>14 A. That's correct.</p> <p>15 Q. <u>Why would you have let him know about this</u></p> <p>16 <u>problem?</u></p> <p>17 A. <u>Mr. Dick was my manager. And we wanted him to be</u></p> <p>18 <u>fully informed about developments in the consideration to</u></p> <p>19 <u>use MTBE in gasoline.</u></p> <p>20 Q. Okay. You go on to state in this letter in the</p> <p>21 third paragraph, "Analyses of ground water samples in</p> <p>22 which odor complaints have been received can</p> <p>23 differentiate between MTBE and IPE. Also, MTBE</p> <p>24 contributes as much to the odor problem as IPE.</p> <p>25 According to Shell, approximately 5 parts per billion in</p>	<p style="text-align: right;">Page 28</p> <p>1 A. That's correct.</p> <p>2 Q. And then Mr. Curran apparently decided to kind of</p> <p>3 check that out, not in any detailed way. There is</p> <p>4 something here called simple experimentation?</p> <p>5 A. I would say that someone had a -- probably had a</p> <p>6 sample containing MTBE and passed it around to different</p> <p>7 people passing by in the office corridor, and this is the</p> <p>8 result of this very unscientific test.</p> <p>9 Q. The basic sniff test?</p> <p>10 A. Yes.</p> <p>11 Q. People reported they could smell it?</p> <p>12 A. Yes, apparently so.</p> <p>13 Q. So certainly by June of 1984 you had information</p> <p>14 that if MTBE were released, it could contaminate ground</p> <p>15 water, drinking water supplies, and cause people to</p> <p>16 report that their water had a detectable odor. Is that</p> <p>17 correct?</p> <p>18 A. Basically correct. And by contaminate, I'm not</p> <p>19 sure exactly what definition you would put upon the word</p> <p>20 "contaminate". If there were a release from an</p> <p>21 underground service station tank of gasoline containing</p> <p>22 MTBE, it is possible that this material could find its</p> <p>23 way into an underground water well or water system.</p> <p>24 Q. Okay. Basically this was known before a decision</p> <p>25 was made by Exxon to put MTBE in gasoline, is that</p>

<p style="text-align: right;">Page 29</p> <p>1 correct?</p> <p>2 A. Yes, but that is to say that we had -- we were</p> <p>3 faced with the same problem when we were -- and all other</p> <p>4 oil companies were marketing hydrocarbon only gasolines.</p> <p>5 There had been over the years incidents of underground</p> <p>6 service station tanks having developed leaks and water</p> <p>7 having -- I mean gasoline having gotten into underground</p> <p>8 water systems.</p> <p>9 <u>Q. Okay. Apparently when you wrote this letter to</u></p> <p>10 <u>your boss, his response was if so, we need to advise</u></p> <p>11 <u>management about the risk associated with MTBE. Is that</u></p> <p>12 <u>your understanding of what happened?</u></p> <p>13 A. That's right.</p> <p>14 Q. Is it your understanding that management was</p> <p>15 advised?</p> <p>16 A. I feel sure they were. I am not aware of</p> <p>17 specifically how that may have been done at this point.</p> <p>18 Q. Okay. If we could back up for a moment.</p> <p>19 A. Uh-huh.</p> <p>20 Q. As a person who worked for Exxon for more than 30</p> <p>21 years --</p> <p>22 A. Uh-huh.</p> <p>23 Q. -- I assume you have an understanding of what</p> <p>24 their practices were before they changed the composition</p> <p>25 of a product important enough -- well, as important as</p>	<p style="text-align: right;">Page 31</p> <p>1 depending on whether they accepted it or rejected it, it</p> <p>2 would proceed on up to the appropriate level.</p> <p>3 Q. Okay. And was it your understanding that for a</p> <p>4 decision like this; that is, to add MTBE to gasoline,</p> <p>5 there would be a package that would be prepared by a</p> <p>6 number of employees working on the subject?</p> <p>7 A. Yes, that's correct.</p> <p>8 Q. And the package would include a discussion of</p> <p>9 potential adverse side effects, is that correct?</p> <p>10 A. Sure.</p> <p>11 Q. So the subject that we're --</p> <p>12 A. If any adverse side effects.</p> <p>13 Q. Sure. So the subject of this letter, the fact</p> <p>14 that MTBE had made its way to drinking water supplies and</p> <p>15 the people reported an objectionable detectable odor, is</p> <p>16 that something that would be a potential adverse side</p> <p>17 effect of the use of MTBE in gas?</p> <p>18 A. Yes, it would.</p> <p>19 Q. Now, is it unusual to have a component of</p> <p>20 gasoline cause complaints about a detectable odor in</p> <p>21 drinking water when the concentration is reportedly as</p> <p>22 low as, according to Shell, 5 parts per billion and then</p> <p>23 in your unscientific sniff test 20 parts per billion?</p> <p>24 A. I'm not really qualified to answer that question.</p> <p>25 Q. Well, based on your years of working with</p>
<p style="text-align: right;">Page 30</p> <p>1 gasoline to Exxon. Is that correct?</p> <p>2 A. That's correct.</p> <p>3 Q. Before a decision could be made to add MTBE to</p> <p>4 gasoline, was it your understanding that a presentation</p> <p>5 needed to be made to management basically reviewing the</p> <p>6 decision that was to be made and alerting them of any</p> <p>7 potential problems so that management could be involved</p> <p>8 in the decision?</p> <p>9 A. That's correct.</p> <p>10 Q. Could you explain briefly how that worked?</p> <p>11 A. Depending on what the change was going to be, I</p> <p>12 think would determine the level to which it reached. It</p> <p>13 may go all the way to the president of Exxon USA, or it</p> <p>14 may stop at the vice-presidential level for marketing and</p> <p>15 refining and the general manager of the supply</p> <p>16 department.</p> <p>17 Q. Okay.</p> <p>18 A. So the approval steps would originate down at my</p> <p>19 level, I think, and in cooperation with the refining</p> <p>20 department and the supply department management review</p> <p>21 packages would be prepared that would show the cost of</p> <p>22 any proposed changes, the pros and cons of having made</p> <p>23 the change, what effect it would have, potential adverse</p> <p>24 side effects of the change. And then this would be</p> <p>25 reviewed with management and at each level, then,</p>	<p style="text-align: right;">Page 32</p> <p>1 gasoline, can you tell me of any other component of</p> <p>2 gasoline that causes that problem at levels that low that</p> <p>3 you're familiar with?</p> <p>4 A. I'm not familiar with any that do or don't,</p> <p>5 really. I don't know what the level of detection. As a</p> <p>6 sort of general rule, the aromatic hydrocarbons tend to</p> <p>7 have more odor to them than do the paraffinic</p> <p>8 hydrocarbons. Olefins tend to have a disagreeable odor,</p> <p>9 but I have no knowledge at all on what level any of these</p> <p>10 ingredients or compounds in water would be detectable to</p> <p>11 the human nose.</p> <p>12 Q. Okay.</p> <p>13 A. And detectability varies immensely across the</p> <p>14 population. Women, for example, have more sensitive</p> <p>15 noses than men. Youth has more sensitive noses than</p> <p>16 older people. And then even within those two broad</p> <p>17 categories there is a wide variation. The condition, if</p> <p>18 one has a cold or an allergy perhaps --</p> <p>19 Q. Sure.</p> <p>20 A. -- and not smelling it.</p> <p>21 Q. Well, was there some reason you decided to write</p> <p>22 your boss about this problem after you talked to Sully</p> <p>23 Curran and he told you about these things? I mean</p> <p>24 weren't you reporting something that you didn't</p> <p>25 previously know?</p>

② JSD

2/6 so we need to
 might want to
 associated w/ MTBE -
 Amoco uses - Can Sully determine if they have same problem?

EXXON PROPRIETARY

June 8, 1984

PLEASE	J K	B W	W J	B B
NOTE				
HANDLE				
JUN 08 1984				
J. S. DICK				

TO: Mr. J. S. Dick

FROM: J. E. Spell

SUBJECT: Ground Water Contamination with Oxygenates
 File: 205.0105
 205.0708

Sully Curran called today regarding some additional information that he had obtained from Shell Oil's environmental people on potential ground water contamination problems with the use of oxygenates in motor gasoline.

As was reported to you by Sully last week, Shell is using both MTBE (methyl tertiary butyl ether) and IPE (isopropyl ether) in some of their motor gasoline. Each of these two oxygenates is present at about 2.5 vol. %.

Analyses of ground water samples in which odor complaints had been received can differentiate between MTBE and IPE. Also, MTBE contributes as much to the odor problem as IPE. According to Shell, approximately 5 parts per billion (in water) is the lower level of detectability for either MTBE or IPE alone or a combination of the two. Sully indicated that some simple experimentation around the office had indicated that about 20 parts per billion MTBE in water was the lower level of detectable odor.


 JES:ej

c: Dr. W. G. Domask
 Mr. V. M. Dugan - Rm 2254B
 Dr. J. Panzer - ER&E (PRD) Linden
 Mr. R. T. Peters - Rm 3765

9457E

CONFIDENTIAL
 Use in S. Tahoe
 Litigation Only



EXSPELL 00025
 CONFIDENTIAL - FOR USE IN LITIGATION SOLELY

Exhibit 12

<div><div></div><div>IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA IN AND FOR THE COUNTY OF SAN FRANCISCO</div><div>--oOo--</div><div>SOUTH TAHOE PUBLIC UTILITY) DISTRICT,)</div><div>) Plaintiff,)</div><div>) vs) No. 999128</div><div>) THIS TRANSCRIPT CONTAINS</div><div>ATLANTIC RICHFIELD COMPANY) CONFIDENTIAL MATERIALS</div><div>("ARCO"); ARCO CHEMICAL COMPANY;))</div><div>SHELL OIL COMPANY; CHEVRON)</div><div>U.S.A., INC.; EXXON CORPORATION;))</div><div>B.P. AMERICA, INC.; TOSCO)</div><div>CORPORATION; ULTRAMAR, INC.;)</div><div>BEACON OIL CO.; USA GASOLINE)</div><div>CORPORATION; SHELL OIL PRODUCTS)</div><div>CO.; TERRIBLE HERBST, INC.;)</div><div>ROTTEN ROBBIE; J.E. TVETEN)</div><div>CORP.; TAHOE TOM'S GAS STATION;)</div><div>THE SOUTHLAND CORP.; PARADISE)</div><div>CHEVRON; and DOES 1 through 600,))</div><div>inclusive,)</div><div>) Defendants.)</div><div>)</div><div>--oOo--</div><div>THURSDAY, JANUARY 13, 2000</div><div>10:07 A.M.</div><div>--oOo--</div><div>DEPOSITION OF</div><div>BARBARA MICKELSON</div><div>--oOo--</div><div>CATHLEEN SLOCUM, CSR</div><div>License No. 2822</div></div>	<div><div></div><div>I N D E X</div><div>EXAMINATION Page</div><div>By Mr. Miller 3</div><div>Reporter's Certificate 201</div><div>--oOo--</div><div>E X H I B I T S</div><div>Plaintiff's Page</div><div>1 Notice of Taking Deposition 3</div><div>2 Handwritten Memo to J.S. Dick 3</div><div>from J.E. Spell</div><div>Confidential</div><div>3 Memo to J.S. Dick from J.E. Spell 3</div><div>dtd June 8, 1984</div><div>Confidential</div><div>4 Memo to S.D. Curran from V.M. 3</div><div>Dugan dtd August 8, 1984</div><div>Confidential</div><div>5 Memo to V.M. Dugan from B.J. 3</div><div>Mickelson dtd August 23, 1984</div><div>Confidential</div><div>6 Letter to J.M.E. Mixter, Jr. from 3</div><div>Tom dtd November 19, 1984</div><div>7 Memo to J.M.E. Mixter from B.J. 3</div><div>Mickelson dtd February 22, 1985</div><div>Confidential</div><div>8 Memo to J.M.E. Mixter from B.J. 3</div><div>Mickelson dtd April 19, 1985</div><div>Confidential</div><div>9 Letter to M.R. Schimmenti dtd 3</div><div>May 1, 1985</div><div>Confidential</div><div>10 Memo to E.J. Hess from R.P. Larkins 3</div><div>dtd June 25, 1985 - Confidential</div></div>
<div><div></div><div>COUNSEL</div><div>For the Plaintiff:</div><div>MILLER, SHER & SAWYER</div><div>BY: DUANE C. MILLER, ESQ.</div><div>100 Howe Avenue, Suite 120</div><div>Sacramento, California 95825-8201</div><div>For the Defendant Terrible Herbst, Inc.:</div><div>PRICE, POSTEL & PARMA</div><div>BY: J. TERRY SCHWARTZ, ESQ.</div><div>200 East Carrillo Street</div><div>Santa Barbara, California 93101</div><div>For the Defendant ARCO Chemical Company, now known as</div><div>Lyondell Chemical Worldwide, Inc.:</div><div>STEPTOE & JOHNSON, LLP</div><div>BY: JAY E. SMITH, ESQ.</div><div>633 West Fifth Street, Suite 700</div><div>Los Angeles, California 90071</div><div>For the Defendant Exxon Corporation:</div><div>EXXON COMPANY, U.S.A.</div><div>BY: ROBERT B. WALLIS, ESQ.</div><div>P.O. Box 2180</div><div>Houston, Texas 77252</div></div>	<div><div></div><div>E X H I B I T S</div><div>Plaintiff's Page</div><div>11 Letter to L.G. Brunt from J. Hack 3</div><div>dtd March 19, 1986</div><div>Confidential</div><div>12 Removing Organics From Groundwater 85</div><div>Through Aeration Plus GAC,</div><div>by Ronald J. McKinnon and John E.</div><div>Dyksen</div><div>13 MTBE as a Ground Water Contaminant, 85</div><div>by Peter Garrett, Marcel Moreau and</div><div>Jerry D. Lowry</div><div>14 Methyl Tertiary Butyl Ether (MTBE): 85</div><div>I.H. Information for OEL Development,</div><div>Presentation to the OEL Committee</div><div>J.R. Tuday, dtd July 18, 1986</div><div>15 Memo to R.P. Larkins from R.T. 85</div><div>Harvin dtd December 30, 1986</div><div>with handwritten notes</div><div>Confidential</div><div>16 Letter to Carmen Carlson from T.G. 85</div><div>Kirkpatrick dtd June 10, 1983</div><div>17 Public Drinking Water Systems 85</div><div>Impacted by MTBE Contamination</div><div>Compiled by Alpine Environmental, Inc.</div><div>February 17, 1998</div><div>18 Letter to T.C. Vick from J. Panzer 85</div><div>dtd October 23, 1984</div><div>Confidential</div><div>19 E-Mail from C. Stanley to C. 85</div><div>Parkinson dtd May 13, 1998</div><div>20 E-Mail from C. Stanley to J.F. 85</div><div>Pedley dtd November 3, 1998</div><div>21 Sheet 2 - Former Texaco Stations 85</div></div>

<p style="text-align: right;">Page 24</p> <p>1 done in our office with MTBE and odors.</p> <p>2 Q Okay. So if I were to try and find Mr. Curran to ask</p> <p>3 him about that, do you happen to know where he may be today?</p> <p>4 A I believe he's in Houston.</p> <p>5 Q Okay. Is he still employed by Exxon or do you know?</p> <p>6 A I believe he's retired. I know he's retired.</p> <p>7 Q Thank you. Let's go to Exhibit 4. This document is by</p> <p>8 V.M. Dugan or Dugan to apparently Sully Curran dated August</p> <p>9 8, 1984. And it lists a number of individuals as receiving</p> <p>10 copies including Mr. Dick that you referred to earlier and</p> <p>11 Mr. Spell who wrote Exhibits 2 and 3.</p> <p>12 Did you have a chance to review this as well as the</p> <p>13 other exhibits before we got started this morning?</p> <p>14 A Yes, I looked at them this morning.</p> <p>15 Q Okay. The subject is MTBE. And it states in the</p> <p>16 second sentence, "Recent assessments of Exxon's G/EC octane</p> <p>17 strategy" -- I'm sorry, I don't know what that is. Can you</p> <p>18 help me?</p> <p>19 A I don't know what the G/EC means.</p> <p>20 MR. WALLIS: Gulf East Coast.</p> <p>21 MR. MILLER: Q Ah, thank you. -- "and potential</p> <p>22 responses to EPA lead phasedown have assumed the use of MTBE</p> <p>23 as a motor gasoline blending component." First of all, do</p> <p>24 you recognize this as an Exxon document?</p> <p>25 A Based on the distribution list, it appears to be an</p>	<p style="text-align: right;">Page 26</p> <p>1 obtained information from them concerning some MTBE</p> <p>2 incidents that had occurred?</p> <p>3 A I don't know that he, he worked with Shell on some task</p> <p>4 forces at the API and whether it came out in his discussions</p> <p>5 with them on task force, I don't know if he made a special</p> <p>6 effort to do it.</p> <p>7 Q Okay. But your understanding was at the time he was a</p> <p>8 source of information that you could obtain so that you</p> <p>9 could do your work on MTBE?</p> <p>10 A I would say that he was one of the sources of</p> <p>11 information, yes.</p> <p>12 Q Okay. It goes on to state at the last sentence of the</p> <p>13 second paragraph, "As part of our product quality assurance</p> <p>14 program, ER&E/PRD monitored the introduction of this</p> <p>15 Mogas-MTBE blend in these markets" -- they're referring to</p> <p>16 the, basically the Texas markets.</p> <p>17 MR. WALLIS: Corpus Christi and Brownsville.</p> <p>18 MR. MILLER: Q Yes. -- "and, by copy of this</p> <p>19 letter to Dr. G.N. Shah, we request ER&E/PRD's assessment of</p> <p>20 their monitoring activity." We've got some terminology in</p> <p>21 here again it might help to get an explanation on.</p> <p>22 A Well, I know ER&E is Exxon Research and Engineering.</p> <p>23 Q Okay. Did you have anything to do with Exxon's</p> <p>24 research and engineering?</p> <p>25 A I worked with them on project issues. We had a lot of</p>
<p style="text-align: right;">Page 25</p> <p>1 Exxon document.</p> <p>2 Q Okay. And when they talk about an EPA lead phasedown,</p> <p>3 does that refer to a decision by the United States</p> <p>4 Environmental Protection Agency to request that lead which</p> <p>5 had previously been included in gasoline be removed?</p> <p>6 A I believe the EPA required that the lead levels be</p> <p>7 lowered.</p> <p>8 Q And is it your understanding from having worked for an</p> <p>9 oil company and been in the field for a while that if you</p> <p>10 take the lead out, that could change the octane level of the</p> <p>11 gasoline?</p> <p>12 A Definitely.</p> <p>13 Q And you could put something like MTBE in the gasoline</p> <p>14 to boost the octane back to where it should be?</p> <p>15 A That's what it would do.</p> <p>16 Q And was that your understanding of the reason at the</p> <p>17 time that MTBE was being considered for use in Exxon's</p> <p>18 gasoline products?</p> <p>19 A Right, to get the octane.</p> <p>20 Q Okay. The next sentence states, "We understand that</p> <p>21 you have information concerning potential groundwater</p> <p>22 contamination problems associated with the use of MTBE in</p> <p>23 motor gasoline and Shell's experience in this area," and</p> <p>24 this of course is addressed to Sully Curran. Was it your</p> <p>25 understanding that Mr. Curran had contacted Shell and had</p>	<p style="text-align: right;">Page 27</p> <p>1 communication about technologies and they were a source of</p> <p>2 support to us when we had project needs.</p> <p>3 Q Okay. Well, in this letter Mr. Dugan writes to Mr.</p> <p>4 Curran and states, "We request your input concerning the</p> <p>5 retail maintenance experience factor with this mogas, e.g.,</p> <p>6 leaking tanks, et cetera." Do you see that?</p> <p>7 A Yes, I do.</p> <p>8 Q Is it your understanding that after this letter was</p> <p>9 written to Mr. Curran, you were asked to work on the</p> <p>10 response?</p> <p>11 A I think that would, either this letter or another</p> <p>12 letter in the same time frame.</p> <p>13 Q So there were a number of requests coming out for</p> <p>14 somebody to do the evaluation on MTBE?</p> <p>15 A I believe based on the two things we've reviewed today</p> <p>16 that would be correct.</p> <p>17 Q Okay. And of course when they refer in this sentence</p> <p>18 to leaking tanks, what are they referring to?</p> <p>19 A I would think when he talks about retail maintenance,</p> <p>20 he's talking about underground storage tanks at a service</p> <p>21 station.</p> <p>22 Q Okay. Basically if we talk about the sixties and the</p> <p>23 seventies when service stations installed storage tanks,</p> <p>24 they were taking steel tanks and putting them in the ground;</p> <p>25 is that correct?</p>

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1 A That would be I think in the sixties and seventies it
2 would be steel tanks in the ground.
3 Q Okay. And, of course, any metal will rust including
4 when you put it in the ground?
5 A That's true.
6 Q And it will rust even more if the ground is wet
7 because the groundwater is high. Is that your
8 understanding?
9 A It could add to it. The conditions of the soil and the
10 groundwater could add to the rate of corrosion.
11 Q You've been out of course to a number of service
12 stations in various parts of the country?
13 A Yes, I have.
14 Q You've seen these steel tanks excavated?
15 A Yes, I have.
16 Q You've seen them corroded to the point where they have
17 holes that leak gasoline?
18 A I have on a couple of occasions seen corrosion that
19 would go all the way through the steel.
20 Q So you literally see a hole in the tank?
21 A I have seen a hole in a tank.
22 Q Okay. And you attributed that to the natural effects
23 of corrosion?
24 A Well, sometimes it's -- well, as a natural process if
25 you have something that dings or damages the steel where

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1 it's placed in a particular backfill where you might have
2 something that damages it, you get a point that then becomes
3 a focus of corrosion because of some damage.
4 Q I see. Is it uncommon in your experience for steel
5 tanks placed in the ground for more than a decade to
6 experience significant corrosion?
7 A I would, I would, based on my experience I would not
8 say that steel tanks in the ground generally over a decade
9 had severe corrosion where holes were through.
10 Q I understand your comment. I'm trying to find out if
11 you put these steel gasoline storage tanks in the ground, if
12 you have potential problems with leaks as a result of those
13 tanks being present over long periods of time?
14 A Depending on the soil conditions and the maintenance at
15 the station, whether or not you have cathodic protection,
16 you could have corrosion impacting the steel tank.
17 Q What is cathodic protection?
18 A Cathodic protection is a way to prevent corrosion
19 because corrosion is an electrical process where electrons
20 go from the steel into the environment and that's how you
21 lose the steel. That's how you actually get corrosion. And
22 if you -- there are two different ways to do cathodic
23 protection. You can put a current on the tank and that
24 will, the electricity will provide the electrons to go out
25 into the environment so the tank doesn't corrode or you can

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1 use what they call sacrificial anode where you put in a
2 metal, magnesium would be a common one, hook it up to your
3 tank and then the corrosion would preferentially destroy
4 that sacrificial anode and leave the tank alone. So there
5 are ways to engineer protection for steel tanks.
6 Q And did Exxon use cathodic protection on some of its
7 tanks?
8 A Yes, it did.
9 Q And not others?
10 A I believe that it was -- I think cathodic protection on
11 steel tanks was fairly standard when I was there.
12 Q Okay. Is it your understanding that on the other tanks
13 there was no cathodic protection for Exxon tanks?
14 A That's not my understanding.
15 Q So in your experience in the general practice in Exxon
16 was to use cathodic protection?
17 A On bear steel tanks, yes.
18 Q Okay. Was there still a problem with leaking tanks in
19 your experience?
20 A Yes, we had leaking tanks and that was what we did in
21 the environmental group.
22 Q Because tanks or the piping associated with them can
23 leak, would that cause an ingredient in gasoline like MTBE
24 to be potentially exposed to groundwater?
25 A If the product escaped the containment system, the tank

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1 and the piping, then depending on the hydrogeology that
2 product could be exposed to groundwater.
3 Q Okay. We have an evaluation from you on this subject.
4 I've marked that as Exhibit 5. It's a document dated August
5 23, 1984. This is a document that you drafted; is that
6 correct?
7 A Yes, it is.
8 Q Could you tell us who you sent it to, please?
9 A To Mr. V.M. Dugan.
10 Q And who is that individual?
11 A I at this point would have to go back through these
12 correspondence, but I believe he was in refining.
13 Q Okay. Is it your understanding that he was in Houston?
14 A Yes, it is.
15 Q And you sent copies of this document to a number of
16 individuals including Sully Curran; is that correct?
17 A That's correct.
18 Q Your boss at the time, Mr. Eaton?
19 A That's correct.
20 Q And Mr. Dick?
21 A Yes.
22 Q And what was Mr. Dick's position at the time?
23 A I don't recall.
24 Q Do you have some understanding of what part of Exxon he
25 worked in?

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1 A I don't recall right now.
 2 Q Okay. If we go to your memo, could you tell us
 3 generally what the purpose was in preparing this memo?
 4 A It was to -- when they asked the question in the August
 5 8th memo about MTBE, I was asked to give some information
 6 about potential groundwater problems that we knew of that
 7 could be associated with the use of MTBE.
 8 Q And did you understand at the time that your final
 9 report on this subject would be considered by management of
 10 Exxon?
 11 A I believe I did.
 12 Q Okay. Now, your first comment about MTBE in this
 13 document is, quote, when dissolved in groundwater, MTBE will
 14 migrate further than BTX. Could you explain to us what
 15 you're referring to there?
 16 A In -- when something dissolves, when these chemicals
 17 get into the groundwater and they start to dissolve, they
 18 interact with the environment immediately and some of the
 19 compounds bind to soil more readily than others. So you get
 20 what chemists call a chromatographic effect. You get the
 21 chemicals that are most likely to bind to soil will be
 22 retarded and stay back and not move and the chemicals that
 23 are less likely to be bound to soil will move further in the
 24 groundwater. So you actually get a separation of these
 25 chemicals as they move through the soil.

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1 Q One of the reasons that that is a concern is that if
 2 MTBE will move further from the source where it was
 3 released, it has a greater potential to move all the way to
 4 a well; is that correct?
 5 A Well, if you're in an environment where you have a
 6 release into groundwater, MTBE would move further than some
 7 of the other constituents that were released at the same
 8 time.
 9 Q And could reach a well where the other constituents
 10 wouldn't?
 11 A That could happen. They could -- you could have a
 12 situation like that.
 13 Q You give an example of that in the next paragraph. You
 14 state a town well in Thurmont, Maryland was contaminated by
 15 a different ether, IPE, which you describe as, quote, "a
 16 similar ether compound, even though the soluble BTX plume
 17 migration was such the well was not contaminated by these
 18 components."
 19 What you're saying here is that an ether reached a
 20 municipal drinking water well in Thurmont, Maryland and no
 21 other constituent of concern from the spill other than IPE
 22 reached the well; is that correct?
 23 A That was the situation at that site at that time.
 24 Q Were you familiar with that site from having worked on
 25 it?

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1 A I had worked on it, yes.
 2 Q I assume, therefore, it was an Exxon site?
 3 A Yes, it was.
 4 Q Do you still consider IPE to be a similar ether
 5 compound to MTBE?
 6 A Similar in that it's an ether compound. It has some
 7 different characteristics but it's an ether. That's what I
 8 think I was talking about.
 9 Q Okay. And basically what you were saying is that Exxon
 10 learned from this experience that ethers could reach
 11 drinking water wells under circumstances where the rest of
 12 gasoline wouldn't move that far?
 13 A That's what I understood at this time in '84. I'm, I'm
 14 concerned a little bit about going further because I don't,
 15 I don't recall whether additional monitoring over time
 16 whether the BTEX got there or not. I don't recall. But at
 17 this time it had not gotten there.
 18 Q Okay. So how long did you work on the Thurmont,
 19 Maryland site?
 20 A I believe I worked on the site until a replacement well
 21 and facility was put in service.
 22 Q I see. Were there problems with the quality of the
 23 water produced by that well as a result of IPE being
 24 present?
 25 A My recollection in meetings with the city officials,

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1 that it was an odor problem. That when IPE was pumped into
 2 the distribution system, customers complained of the odor.
 3 Q I see. So they had to stop using the well?
 4 A That's my recollection.
 5 Q So it wasn't so minor that they could just keep
 6 providing the water, that was your understanding at the
 7 time?
 8 A Well, I think that they had other, they had other wells
 9 to pump from and so they made a choice to shut that well
 10 down.
 11 Q Okay. Approximately when to your understanding did
 12 Exxon learn that the municipal well in Thurmont, Maryland
 13 was contaminated by a constituent of Exxon gasoline, namely,
 14 IPE?
 15 A I believe it was probably in 1984, early 1984 or
 16 mid-'84.
 17 Q Just so the record is clear, what is IPE?
 18 A Isopropyl ether.
 19 Q Is this another ether compound that can raise the
 20 octane level of gasoline?
 21 A I believe yes, that's what it would do.
 22 Q You go on to state that the cost of replacing the well
 23 was expected to exceed \$500,000; is that correct?
 24 A That's correct.
 25 Q Then you give another example in your memorandum that

<p style="text-align: right;">Page 40</p> <p>1 A That's correct.</p> <p>2 Q And what you report after describing its mobility is</p> <p>3 that MTBE has lower odor and taste thresholds than BTX. BTX</p> <p>4 refers to what?</p> <p>5 A The B is benzene, the T is toluene, and the X would be</p> <p>6 xylene.</p> <p>7 Q And those are three components of gasoline; is that</p> <p>8 correct?</p> <p>9 A Yes.</p> <p>10 Q And when you say lower taste and odor thresholds, what</p> <p>11 you're indicating is that at lower concentrations MTBE can</p> <p>12 be noticeable?</p> <p>13 A That's my understanding, yes, and that's what I'm</p> <p>14 saying.</p> <p>15 Q And the way it's noticeable is that it causes a taste</p> <p>16 or odor complaint because it changes the taste of water in</p> <p>17 the way that is considered unpleasant?</p> <p>18 A That's correct.</p> <p>19 Q And Exxon knew that in 1984?</p> <p>20 A That's correct.</p> <p>21 Q And you knew that the levels that it could do that were</p> <p>22 reported to be as low as five parts per billion?</p> <p>23 A They were reported to be that low, but I don't know if</p> <p>24 we were able to confirm that.</p> <p>25 Q I see. Did Exxon to your knowledge make an effort to</p>	<p style="text-align: right;">Page 42</p> <p>1 Q Did you believe it to be true at the time?</p> <p>2 A At the time I did.</p> <p>3 Q And is it your understanding that if you have a private</p> <p>4 home and you try to put one of these small cartridges on the</p> <p>5 water that's coming out of the tap, that the small cartridge</p> <p>6 just wouldn't do the job of getting MTBE out?</p> <p>7 A Well, I think it would initially take it out but the</p> <p>8 phenomenon is that it would, all the sites that could absorb</p> <p>9 MTBE would be taken up fairly rapidly and then the MTBE</p> <p>10 would just pass through in the water.</p> <p>11 Q So you're basically saying it wasn't very effective?</p> <p>12 A I think it, it was not, in my opinion at that time that</p> <p>13 would not have been an effective way to treat the water.</p> <p>14 Q Okay. The context in which you were stating that was</p> <p>15 small household carbon filtration units, correct?</p> <p>16 A That's correct.</p> <p>17 Q As an engineer were you aware of larger units that are</p> <p>18 sometimes used on public drinking water systems?</p> <p>19 A Yes, I was.</p> <p>20 Q And if you change the carbon out frequently enough,</p> <p>21 would they work to remove MTBE?</p> <p>22 A Yes, they would.</p> <p>23 Q But if you dealt with private homes and private wells,</p> <p>24 there was a practical problem with trying to get it out of</p> <p>25 drinking water?</p>
<p style="text-align: right;">Page 41</p> <p>1 determine the lowest level of MTBE that apparently caused</p> <p>2 taste and odor problems?</p> <p>3 A I believe Exxon, the API, different people looked at</p> <p>4 that, and I think the numbers that I've seen reported were</p> <p>5 higher than five parts per billion.</p> <p>6 Q We'll come back to that subject later. You describe</p> <p>7 another problem. In the same paragraph you state, "This low</p> <p>8 threshold will extend the clean up and testing time to close</p> <p>9 out a well contamination incident." What are you referring</p> <p>10 to?</p> <p>11 A Just that if we are having to look at lower levels and</p> <p>12 that the levels are going to drop over time with what</p> <p>13 actions we take, and if we have to do something to the well,</p> <p>14 it's just going to take longer to get it down to these lower</p> <p>15 levels.</p> <p>16 Q Okay. The third problem you describe in the same memo</p> <p>17 is, "... MTBE cannot be removed by carbon" absorption.</p> <p>18 MR. WALLIS: Adsorption.</p> <p>19 MR. MILLER: Q Adsorption. "Small household</p> <p>20 carbon filtration units are used by Exxon to treat private</p> <p>21 drinking supplies contaminated by BTX. This option would</p> <p>22 not provide adequate treatment for water supplies</p> <p>23 additionally contaminated by MTBE." Do you see that</p> <p>24 statement?</p> <p>25 A Yes, I do.</p>	<p style="text-align: right;">Page 43</p> <p>1 A Well, the concern with using carbon was how frequently</p> <p>2 you'd have to change it out.</p> <p>3 Q Sure. And if you're talking about change outs, how</p> <p>4 often are we talking about for households?</p> <p>5 A It would depend on the concentration in the water. The</p> <p>6 concentration would determine how fast. So if it were low</p> <p>7 concentration, it could go for a much longer time than if it</p> <p>8 were a higher concentration.</p> <p>9 Q Did you have circumstances in your experience where</p> <p>10 you'd have to change out these small household units several</p> <p>11 times a month?</p> <p>12 A I'm thinking of some sites that we had in the mid</p> <p>13 Atlantic states where probably once a month was as</p> <p>14 frequently as I can remember a change out.</p> <p>15 Q I see. And what do you mean by the mid Atlantic sites</p> <p>16 that you referred to?</p> <p>17 A Maryland and Pennsylvania, that kind of area.</p> <p>18 Q Now, this was during the time that you were employed by</p> <p>19 Exxon, you were working at sites in Maryland and</p> <p>20 Pennsylvania?</p> <p>21 A Yes, I did have responsibility for sites back there.</p> <p>22 Q Okay. Did you come up with a solution if these, you</p> <p>23 know, under the counter little charcoal filters weren't</p> <p>24 working for private homes, was there something else you</p> <p>25 could do for the people that had MTBE in their water?</p>

<p style="text-align: right;">Page 44</p> <p>1 MR. WALLIS: In general or in Maryland and 2 Pennsylvania?</p> <p>3 MR. MILLER: Q Well, I want to go back to the time 4 period that she was employed by Exxon. During that period 5 when you were working in Maryland and Pennsylvania, did you 6 come up with a different solution?</p> <p>7 A I guess I'm not in sites where there were other 8 solutions to deal with it. Sometimes we would arrange for 9 public water supply to replace the water supply. We would 10 drill a new well for the user. Those were other options so 11 that we didn't do continual treatment.</p> <p>12 We did do some air stripping of like the city of 13 Thurmont that was air stripping to clean the water. So 14 there were other options that were applied.</p> <p>15 Q I see. You state in your August 1984 memo, "In 16 summary, there appear to be three reasons MTBE could add to 17 groundwater incident costs and adverse public exposure." 18 correct?</p> <p>19 A That's correct.</p> <p>20 Q What were the three reasons?</p> <p>21 A I believe the three reasons were the fact that it would 22 dissolve and migrate further, had the lower taste and odor 23 threshold and was more difficult to clean up out of the 24 drinking water.</p> <p>25 Q You go on to report on the next page of the document</p>	<p style="text-align: right;">Page 46</p> <p>1 A That's what I was saying.</p> <p>2 Q You go on to state in this same letter that you were 3 aware of Shell's experience with MTBE contamination, if we 4 look at the first paragraph at the top of the second page; 5 is that correct?</p> <p>6 A Is that the paragraph that starts "Finally"?</p> <p>7 Q It's the one that starts on, "Based on higher mobility 8 and taste/odor characteristics of MTBE, Exxon's experiences 9 with" contaminants "in Maryland and our knowledge of Shell's 10 experience with MTBE contamination incidents, the number of 11 well contamination incidents is estimated to increase three 12 times following the widespread introduction of MTBE into 13 gasoline." Do you see that statement?</p> <p>14 A Yes, I do.</p> <p>15 Q And was that your estimate at the time?</p> <p>16 A That was my estimate at the time based on the 17 information that I had.</p> <p>18 Q So basically you were saying that if MTBE were put into 19 Exxon gas, the number of contamination incidents that 20 required cleanup would triple?</p> <p>21 A That's how I would read it.</p> <p>22 Q And when you're referring to Shell's experience with 23 MTBE contamination incidents, were you referring among other 24 things to the Rockaway incident?</p> <p>25 A That's one that I did have some, had heard about and</p>
<p style="text-align: right;">Page 45</p> <p>1 that since 1978 Exxon has been exposed to three major 2 groundwater incidents, listing East Meadow, Long Island, 3 Canob Park, Rhode Island and Jacksonville, Maryland, 4 correct?</p> <p>5 A That's correct.</p> <p>6 Q Did you work on those three sites?</p> <p>7 A I worked on two of the three.</p> <p>8 Q Okay. Is it your understanding that each of those 9 sites was major groundwater contamination incidents caused 10 by release of gasoline from a gas station?</p> <p>11 A I don't know on East Meadow exactly because I wasn't 12 involved directly in that one. But the Canob Park, Rhode 13 Island and the Jacksonville were releases of gasoline into 14 the subsurface and into the groundwater.</p> <p>15 Q And you indicated that the cost of those three 16 incidents could be as high as seven million dollars each?</p> <p>17 A Again, that was based -- that's what it says based on 18 East Meadow.</p> <p>19 Q And you're referring to the cost to Exxon, correct?</p> <p>20 A I believe that would be correct.</p> <p>21 Q And you're indicating that if MTBE were added to 22 gasoline in this letter, you would expect those costs to 23 increase beyond the seven million dollars that it cost to 24 clean up what I'm going to call ordinary gasoline or 25 gasoline without MTBE?</p>	<p style="text-align: right;">Page 47</p> <p>1 that was probably the one that the Shell people were talking 2 about. I don't remember, but that's probably it.</p> <p>3 Q Okay. You were aware of the Rockaway incident by 1984; 4 is that correct?</p> <p>5 A Yes.</p> <p>6 Q And when you refer to Exxon's experience with 7 contamination in Maryland, are you referring to the Thurmont 8 and Jacksonville sites that you discussed earlier in this 9 letter?</p> <p>10 A Yes, I think I was.</p> <p>11 Q And others?</p> <p>12 A I can't think of another case in Maryland that had the 13 ethers as a problem.</p> <p>14 MR. MILLER: Okay. We need to take a break now. 15 I've got the whatever it is, the frog that jumps into your 16 throat, and I've got to drink a little bit of water so I 17 don't lose my voice. Thank you.</p> <p>18 THE VIDEOGRAPHER: Going off the record at 11:13. 19 (Thereupon a brief recess was taken.)</p> <p>20 THE VIDEOGRAPHER: Back on record 11:22.</p> <p>21 MR. MILLER: Q If we could return to Exhibit 5, 22 please, the second page that we were on just before we took 23 the break. In the second paragraph you indicate that when 24 you have a groundwater contamination incident with MTBE, it 25 was your projection that it would take longer to clean it up</p>

<p style="text-align: right;">Page 64</p> <p>1 responsibility for maintaining the tank systems.</p> <p>2 Q Okay. Did you make that statement based on discussions</p> <p>3 with other people employed by Exxon at the time, that is,</p> <p>4 that if MTBE were added to Exxon gas there was going to be a</p> <p>5 detailed risk assessment to determine where additional</p> <p>6 monitoring in the form of monitoring wells should occur?</p> <p>7 A I would, I would think that I had discussions with</p> <p>8 Mr. Decker and Mr. Eaton.</p> <p>9 Q Okay. You wouldn't make a statement like that on your</p> <p>10 own?</p> <p>11 A Well, I think that it would be something that I would</p> <p>12 review with my supervisor, the department. It's something</p> <p>13 that I don't think that I would sign off and copy them</p> <p>14 without making sure that they knew I was going to say that.</p> <p>15 Q Okay. So at least as you understood it, it was your</p> <p>16 group's decision that if Exxon went ahead with the use of</p> <p>17 MTBE, you would be recommending a detailed risk assessment</p> <p>18 with monitoring?</p> <p>19 A That's how I read this memo.</p> <p>20 Q Okay. And the monitoring would be to install</p> <p>21 monitoring wells that could check the condition of</p> <p>22 groundwater right near the service station and thereby let</p> <p>23 you know if you were having a problem quickly?</p> <p>24 A That was one of the techniques in these monitoring</p> <p>25 programs. Other things that were done were the inventory</p>	<p style="text-align: right;">Page 66</p> <p>1 drive you to deal with the older tank first.</p> <p>2 Q Because corrosion or other factors associated with age</p> <p>3 might cause that one to leak with a greater frequency?</p> <p>4 A Again, if there were no other factors involved, I would</p> <p>5 say that then you only would make your decision based on</p> <p>6 age. I would look at the older tanks.</p> <p>7 Q Okay. And this letter was sent to Mr. Mixer. Was he</p> <p>8 head of the marketing department at the time?</p> <p>9 A I don't know what his title was at the time.</p> <p>10 Q It was sent to Mr. Eaton who was your boss?</p> <p>11 A At that time I worked directly for Art Decker who</p> <p>12 worked for Mr. Eaton.</p> <p>13 Q I see. Mr. Eaton had been promoted?</p> <p>14 A No. I think that Mr. Decker was brought in to --</p> <p>15 Mr. Eaton was in the same job, but Mr. Decker was brought in</p> <p>16 to coordinate the environmental activities.</p> <p>17 Q <u>Okay. If we could turn to Exhibit 8, we now have a</u></p> <p>18 <u>third memo again signed by yourself, again addressed to Mr.</u></p> <p>19 <u>Mixer. Dated just what, about two months later than the</u></p> <p>20 <u>memo we just went over, namely, April 19, 1985; is that</u></p> <p>21 <u>correct?</u></p> <p>22 A <u>That's correct.</u></p> <p>23 Q <u>So this would be your third memo on MTBE and its</u></p> <p>24 <u>potential for causing groundwater contamination problems in</u></p> <p>25 <u>less than a year?</u></p>
<p style="text-align: right;">Page 65</p> <p>1 control and tank testing.</p> <p>2 Q So you'd be doing more for gasoline that contained MTBE</p> <p>3 than you were doing before you had gasoline that contained</p> <p>4 MTBE?</p> <p>5 A I think that all those things were done routinely for</p> <p>6 the gasoline. I don't want to suggest that there wasn't a</p> <p>7 concern about gasoline not containing MTBE, but my</p> <p>8 recommendation was to be more aggressive or to look at the</p> <p>9 need for monitoring more, more directly or more thoroughly</p> <p>10 because MTBE increased some risks that I had identified</p> <p>11 previously.</p> <p>12 Q Okay. Now, this detailed risk assessment that you</p> <p>13 referred to would have been used to try to identify sites</p> <p>14 that might be more sensitive than others to contamination</p> <p>15 problems so that you could invest your money in the</p> <p>16 monitoring where the greatest risk was, was that the idea?</p> <p>17 A Well, I think it, the idea was to look at things like</p> <p>18 the soil conditions, the tank age, other things to determine</p> <p>19 which ones would, you know, may need to be addressed sooner</p> <p>20 than others. So it's a combination of the soil, equipment</p> <p>21 and where you were located, things like that.</p> <p>22 Q Okay. So the older the tank, would that tend to</p> <p>23 indicate the greater the need assuming the soil conditions</p> <p>24 were the same?</p> <p>25 A I think that if everything were the same, age would</p>	<p style="text-align: right;">Page 67</p> <p>1 A <u>That would be correct.</u></p> <p>2 Q Were you writing these memos because you were being</p> <p>3 asked more and more questions or because you had new</p> <p>4 information? Why did you keep writing? Could you explain</p> <p>5 that?</p> <p>6 A <u>I think the first memo was a general question, you</u></p> <p>7 <u>know, what if we put MTBE in our gas. The second one was</u></p> <p>8 <u>more focused, what if we put MTBE in the particular Texas</u></p> <p>9 <u>pipeline situation. And this third one, again, it's the</u></p> <p>10 <u>Texas transmission, but it looks like they've added some</u></p> <p>11 <u>other locations. They've added Florida, South Carolina and</u></p> <p>12 <u>North Carolina. So I think each time they wanted to get</u></p> <p>13 <u>another check on, okay, if we do this, what do you say?</u></p> <p>14 <u>Okay, what if we just do a smaller thing, what do you say?</u></p> <p>15 <u>Okay. Now, we've got a slight change. So they just keep</u></p> <p>16 <u>coming back and making sure that they get our input on each</u></p> <p>17 <u>choice that they're evaluating.</u></p> <p>18 Q Okay. It certainly wasn't because they didn't</p> <p>19 understand what your concerns were that they kept coming</p> <p>20 back to you?</p> <p>21 A No, I think they understood what my concerns were.</p> <p>22 Q And it wasn't because they disagreed with what you were</p> <p>23 saying?</p> <p>24 A I had not heard that they disagreed with what I was</p> <p>25 saying.</p>

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1 Q It was because they wanted to look at a different
2 scenario?
3 A That's -- my thought is there's a system of getting
4 input and if they went to management and said here's our
5 proposal, management would say, what did marketing
6 environmental say about that? They said, well, we didn't
7 ask them. That wouldn't work within Exxon. So they had to
8 come back and get the input.

9 Q I see. So this third one, Exhibit 8, is an attempt to
10 look at the use of MTBE in the Texas Eastern Transmission
11 area that would include sending gasoline to Jacksonville,
12 Florida, Charleston, South Carolina, and Wilmington, North
13 Carolina areas which I assume includes some outlying
14 communities. Was that your understanding?
15 A As I'm looking at it today I'm not sure whether the
16 Texas Eastern Transmission serviced those additional areas
17 or if they were going to get -- I'm not sure if those are
18 four different locales with different service or if the
19 Texas Eastern encompasses that.

20 Q Okay.

21 A I'm not sure.

22 Q But what you do recall is this memo was designed to
23 discuss the potential impact of having MTBE in gas not just
24 in the Texas pipeline but also in Florida, South Carolina
25 and North Carolina?

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1 A That's, my read of it today as I'm looking at it is we
2 had the question about the Texas Eastern and this is
3 additional areas.

4 MR. MILLER: Okay. We're going to have to go off
5 the video record for just a minute.

6 THE VIDEOGRAPHER: Going off record at 11:55.

7 (Thereupon a brief recess was taken.)

8 THE VIDEOGRAPHER: Back on record 11:56.

9 MR. MILLER: Q I'd like to review your April 19,
10 1985 memo briefly. First thing you do in the memo is you
11 give four reasons why there is an environmental risk of
12 using MTBE. You do them as bullet points; is that correct?

13 A That's correct.

14 Q And like your prior memos you point out that MTBE has
15 higher solubility, correct?

16 A That's correct.

17 Q It has special taste and odor, correct?

18 A That's correct.

19 Q It has a higher differential transportation rate which
20 is language you use to say it's more mobile than some of the
21 other components of gasoline?

22 A I use because it, again, when you look at how it
23 functions and where it goes, it travels differently and
24 isn't adsorbed by the soils. So it goes with the water in a
25 different way than others do.

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1 Q Okay. So it's not because you don't want to refer to
2 that other oil company, Mobil, it's because --

3 A To me it just, it doesn't, it isn't as accurate.

4 Q Okay.

5 A I wouldn't -- I'm sure I've used that in conversation,

6 but it can't move faster than water. It moves with the
7 water. It moves through the environment just like the other
8 constituents, but it doesn't get adsorbed. It has this
9 chromatographic effect that we were seeing. So it could
10 move out beyond the benzene, for instance, and get further
11 away from the source.

12 Q Basically MTBE goes where the water goes, it doesn't
13 stick to the soil?

14 A Basically that's what happens. It doesn't like soil as
15 much as some of the other constituents do.

16 Q Okay. And then the fourth bullet point is MTBE cannot
17 be removed below detectable levels by carbon adsorption and,
18 therefore, must be treated by more complicated and expensive
19 air stripping columns, correct?

20 A What I think I said earlier, it can be removed by
21 carbon adsorption and different, you know, carbon has
22 developed a lot since the time I wrote this memo in terms of
23 things. So I wouldn't have written it the same way today,
24 but at that time with my experience on carbon that's what I
25 thought.

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1 Q It's your understanding we've got some new and improved
2 carbon these days; is that correct?

3 A I believe we have some new and improved carbon.

4 Q All right. They actually make carbon different ways
5 depending upon what chemical you're trying to filter out.
6 Is that your understanding?

7 A There are some, there are some, you know, polymer
8 enhanced carbons that go in one direction and a whole
9 variety of carbons. So you can get special carbons for
10 different chemicals in a way that we didn't have as much
11 information about in 19 -- you know, they just -- it wasn't
12 as big an industry in 1985. So I just -- I would not say
13 today that you can't remove it from solution to below
14 detectable levels.

15 Q Okay.

16 A That, I just wanted to clarify that that was what my
17 position was based on my understanding and experience in
18 1985.

19 Q Okay. Now, apparently because of the trend in coming
20 back to you for requests, even though you were responding
21 for a two-way request for information on Texas, Florida and
22 the Carolinas, you even, you went further and mentioned the
23 US as a whole? If you look at --

24 A Well, I believe I read this a little, while we were
25 taking a break I looked at the letter again. And I see that

<p style="text-align: right;">Page 72</p> <p>1 we talk about the Texas Pipeline System and the Texas 2 Eastern Transmission System are not the same thing. They're 3 different things. 4 Q Okay. 5 A In our earlier conversation I was looking at Texas 6 Eastern and thinking it was the pipeline, but they're two 7 different things. So this is a, this isn't the same request 8 with a different, like some add-on, this is a completely new 9 request. 10 Q Okay. I guess my point is if you look at your four 11 bullets and the paragraph immediately below, after going 12 over those four points you state, "As a result we recommend 13 that from an environmental risk point of view MTBE not be 14 considered as an additive to Exxon gasolines on a blanket 15 basis throughout the United States." 16 A That was the conclusion. 17 Q And you use the term "we" not in the royal sense but to 18 discuss what you and your colleagues agreed upon; is that 19 correct? 20 A I think that we were talking about real estate and 21 engineering. I think at this, I'm looking at the cc list, 22 and now we've added W.E. Gattis who was Mr. Eaton's 23 supervisor. So, again, I'm making a recommendation based on 24 review, but the recommendation is really being submitted by 25 real estate and engineering services, the group that did the</p>	<p style="text-align: right;">Page 74</p> <p>1 Q So certainly this memo couldn't be read as a 2 recommendation to use MTBE in gasoline in California? 3 A No. It wasn't addressing California. 4 Q California is a little different than Texas now that 5 you've been out here, not just the climate, not just the 6 humidity, not just the number of folks in the oil business, 7 but for some other reasons relating to your field, 8 hydrogeology? 9 A I would say that's true. 10 Q Okay. There are quite a few public drinking water 11 systems here in California that rely on groundwater. Is 12 that your understanding? 13 A Yes. 14 Q And there have been some contamination problems in some 15 of those wells associated with activities by us folks 16 walking around on the surface, correct? 17 A I'm not sure I understand that question that way. 18 Q Substances introduced at the surface are finding their 19 way to California wells, public drinking water wells. Is 20 that your understanding? 21 A I believe that's true. 22 Q Okay. You again reference the Texas Pipeline System 23 and the factors that lead you to conclude that it would be 24 okay. What you state is, after discussing the Texas 25 Pipeline System, you state, "Therefore, we saw no overriding</p>
<p style="text-align: right;">Page 73</p> <p>1 environmental work for marketing. 2 Q So this is a report by a group of people employed by 3 Exxon who have expertise in environmental contamination 4 incidents to somebody whose three levels above where you are 5 in the chain of command in Exxon? 6 A I don't know exactly where Mr. Mixter fits. He may 7 have been at Mr. Gattis' level. He may have been at 8 Mr. Eaton's level. 9 Q Okay. 10 A He may have been at Mr. Decker's level. I just don't 11 know. 12 Q But certainly it was going to people higher up in the 13 company? 14 A Yes. 15 Q The purpose of this was to give information to 16 management so that a good decision could be made? 17 A I believe that's correct. 18 Q Okay. You go on to state after your group made the 19 recommendation that it not be used on a blanket basis 20 throughout the United States, that, quote, "... on an 21 area-by-area basis the risks to the environment differ." 22 A Right. 23 Q And that was your opinion at the time; is that 24 correct? 25 A That's correct.</p>	<p style="text-align: right;">Page 75</p> <p>1 reason to and did not recommend against the addition of MTBE 2 in the Texas Pipeline System," correct? 3 A That's correct. 4 Q Is that different than saying I recommend that you use 5 it? 6 A I don't think it -- it wasn't my position to recommend 7 that they use it. There would be other reasons to use it. 8 But here I didn't, as a result of the risks that we saw in 9 that particular distribution area, we didn't recommend 10 against it. 11 Q Okay. You then state in the next paragraph, "The 12 mitigating factors which reduce the risks associated with 13 the addition of MTBE in the Texas Pipeline System do not 14 exist in other areas of the country where we market," 15 correct? 16 A That was my understanding of where we market and what 17 the characteristics were. 18 Q Okay. You go on to state, "From an environmental risk 19 point of view we recommend against introducing MTBE into the 20 Texas Eastern Transmission System and the Southeast Atlantic 21 Coast"? 22 A That's correct. 23 Q Now, that would have included the state of North 24 Carolina? 25 A Well, at least the Wilmington area.</p>

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1 government or is it generated by you think one of the
 2 defendants or do you know?
 3 MR. MILLER: I can't answer that question from
 4 memory. I'm sorry.
 5 MR. WALLIS: We'll assume it either way then.
 6 Barbara, we're going to assume that this document was
 7 generated by someone other than Exxon, either the government
 8 or some other oil company, and for the record we'll preserve
 9 our objection to the authenticity of this document until
 10 it's been established.
 11 MR. MILLER: Right.
 12 Q The comment in the document by the EPA is, quote, "An
 13 additional concern brought out by TRDB" -- which refers to
 14 Test Rules Development Branch -- "research was the
 15 contamination of groundwater supplies by MTBE. There are
 16 over 700,000 underground storage tanks for petroleum
 17 products in the U.S. and about 30 percent of these tanks
 18 leak," end quote. Do you see the statement?
 19 A Yes, I do.
 20 Q Now, at the time, that is, in mid. in the mid-eighties,
 21 you would have been generally familiar with the whole
 22 subject of underground storage tanks leaking; is that
 23 correct?
 24 A That's correct.
 25 Q You would have followed some of the articles in the

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1 professional literature concerning the subject?
 2 A I believe I did.
 3 Q And, of course, you would have had access to Exxon
 4 internal documents concerning their leak experience?
 5 A I did. That was kept by the group that I supervised.
 6 Q Okay. And you were familiar with the fact that there
 7 was some concern at the time that underground storage tanks
 8 needed to be replaced with double-walled tanks so that you
 9 would have a place for the gas to go if it escaped the
 10 initial confinement that wouldn't involve a release to the
 11 environment, were you aware of that generally?
 12 A In locales, at that time there were locales where
 13 double-walled tanks were the standard and they were used and
 14 there were other locales where single-walled fiberglass with
 15 monitoring was acceptable and was used. So it depended on
 16 where you were.
 17 Q But there were some reports and concerns about
 18 underground gasoline storage tanks leaking in the
 19 mid-eighties?
 20 A There certainly were.
 21 Q And the statistic that's mentioned here, first that
 22 there were approximately 700,000 underground gasoline
 23 storage tanks, is that generally what you understood to be
 24 the case at the time?
 25 A I had not seen a number like that. I knew that Exxon

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1 had at that time, I recall we had 20,000.
 2 Q I see. And it states about 30 percent of the
 3 underground gasoline storage tanks in the US leak.
 4 A I see that.
 5 Q All right. Do you agree or disagree with that
 6 statistic?
 7 A I, I don't have any information to, in terms of that
 8 universe of 700,000 underground storage tanks, to say
 9 whether that 30 percent is correct or not. I don't think
 10 that we had a 30 percent leak rate in the tanks that I was
 11 monitoring while I was at Exxon.
 12 Q You think it was less or more?
 13 A I think it was less.
 14 Q Okay. Was it above ten percent?
 15 A I don't recall a number like that.
 16 Q Are you able to give us an estimate?
 17 A I can't from memory, no.
 18 Q Okay. In any event, it was well-known in the
 19 mid-eighties that underground storage gasoline tanks can
 20 leak; is that correct?
 21 A I think that was an issue at that time.
 22 Q And various things were being done about it including
 23 trying to upgrade the tanks; is that correct?
 24 A That's correct.
 25 Q All right. Let's go to Exhibit 11. This is a two-page

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1 document on Exxon Research and Engineering Company
 2 letterhead. Apparently they're in New Jersey. And it's
 3 signed by J. Hack, H-a-c-k, dated March 19, 1986. Does this
 4 appear to be an Exxon document to you, ma'am?
 5 A Yes, it does.
 6 Q And he reports that he's looking for data on MTBE and
 7 IPE, and specifically data concerning physical properties,
 8 contamination of groundwater, water treatment technology and
 9 health aspects. Do you see that reference?
 10 A He said he looked for the data on those things, that's
 11 correct.
 12 Q And then he reports a series of publications were found
 13 and he sent them on to Mr. Brunt of Exxon engineering
 14 technology department?
 15 A I see that.
 16 Q Okay. If we go to the second page, he reports that
 17 there was an incident in Rockaway, New Jersey involving MTBE
 18 and cites to a 1984 published article, correct?
 19 A I see that.
 20 Q I'd like to turn to the article that was referenced by
 21 the Exxon employee I just mentioned, Exhibit 12. This is a
 22 1984 article published in the Journal of the American Water
 23 Works Association entitled, "Removing Organics From
 24 Groundwater Through Aeration Plus GAC." Do you recall
 25 reading any articles concerning the Rockaway Township

August 23, 1984

TO: V. M. Dugan
FROM: B. J. Mickelson
SUBJECT: MTBE Contamination of Ground Water

The following is in response to your August 8, 1984, memo to Mr. S. D. Curran requesting information on additional potential ground water contamination problems that are associated with the use of MTBE in gasoline.

First MTBE, when dissolved in ground water, will migrate farther than BTX before soil attenuation processes stop the MTBE migration.

For example, a town well in Thurmont, Maryland was contaminated by IPE, a similar ether compound, even though the soluble BTX plume migration was such that the well was not contaminated by these components. Well replacement costs are expected to exceed \$500k in this case.

Another example is at Jacksonville, Maryland where the leading edge of the Gulf MTBE plume has not been controlled and migrated over twice the distance of the Exxon BTX plume migration, which has been halted. We are now facing onerous Federal EPA compliance actions which will add costs to this multimillion dollar incident.

Second, MTBE has lower odor and taste thresholds than BTX. Therefore low, non-hazardous, analytically non-detectable levels of MTBE continue to be a source of odor and taste complaints in affected drinking water. This low threshold will extend the clean up and testing time to close out a well contamination incident.

Third, MTBE cannot be removed by carbon adsorption. Small household carbon filtration units are used by Exxon to treat private drinking supplies contaminated by BTX. This option would not provide adequate treatment for water supplies additionally contaminated by MTBE. Air stripping or a combination of air stripping and carbon adsorption would be required to clean up water contaminated by BTX and MTBE. Attachment A compares initial and operating costs associated with various treatment options.

In summary, there appear to be three reasons MTBE could add to ground water incident costs and adverse public exposure.

EXHIBIT

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Based on higher mobility and taste/odor characteristics of MTBE, Exxon's experiences with contaminations in Maryland and our knowledge of Shell's experience with MTBE contamination incidents, the number of well contamination incidents is estimated to increase three times following the widespread introduction of MTBE into Exxon gasoline. With 62 ground water clean up activities underway at an average annual cost of \$3M, this represents an increase of some 120 or \$6M to a total of 180 and \$9M annual cost.

Finally, the closing-out of these incidents would take longer and treatment costs would be higher by a factor of 5 (Attachment A). Therefore, we estimate that by extending close-out times the 180 incidents would double to over 300. Shell Oil currently has over 300 ongoing contamination incidents which resulted at some 4,000 retail facilities, versus 62 incidents at Exxon's 7,000 retail facilities. The estimated additional costs involved would result in annual leaker incident costs exceeding \$20M.

There is a fourth, and probably the most significant, consideration. Any increase in potential ground water contamination will also increase risk exposure to major incidents. Since 1978, Exxon has been exposed to three major ground water incidents (East Meadow, L.I.; Canob Park, R.I.; Jacksonville, MD). While the most recent cases are unsettled, the cost of these incidents can be as high as \$7M each based on East Meadow. Therefore, if the trend of one \$7M suit every two years is increased commensurate with the number of ongoing outstanding incidents (i.e., current 62 to over 300) then annual major incident costs would increase from \$3.5M to some \$18M.

Taking the above four factors into consideration, it would appear that widespread use of MTBE has the potential of increasing our ongoing contamination incidents from a current of 62 to over 300 and costs from \$6.5M (\$3M and \$3.5M) to over \$40M (\$+20M and \$+18M).

Please call me if you have any questions regarding the concerns outlined above.

Barbara J. Mickelson

- BJM:jm

c - S. D. Curran
J. S. Dick
R. R. Eaton

*0499g

April 19, 1985

RECEIVED
APR 25 1985

TO: Mr. J. M. M. Mixer

FROM: B. J. Mickelson *B. J. Mickelson*

SUBJECT: Introduction of Methyl Tertiary Butyl Ether (MTBE) in the Texas Eastern Transmission, Jacksonville, Florida; Charleston, South Carolina; and Wilmington, North Carolina Areas

As stated in previous memos dated February 22, 1985, and August 23, 1984, (attached) the inclusion of MTBE in Exxon gasoline is of concern as an incremental environmental risk for four reasons.

- MTBE has a much higher aqueous solubility than other soluble gasoline components, such as Benzene;
- MTBE has a lower taste and odor threshold than other soluble gasoline components;
- MTBE has a higher differential transport rate than other soluble gasoline components;
- MTBE unlike Benzene, Toluene and Xylene cannot be removed from solution to below detectable levels by carbon adsorption and must be treated by more complicated and expensive air stripping columns.

As a result we recommend that from an environmental risk point of view MTBE not be considered as an additive to Exxon gasolines on a blanket basis throughout the United States.

However, on an area-by-area basis the risks to the environment differ. As stated previously, in the Texas Pipeline system, we have experienced no known drinking water contamination incidents. This favorable incident record is a result of geohydrologic factors such as depth to potable aquifers, overlying confining layers, and cultural factors such as public utility districts supplying drinking water limiting the number of wells which could be impacted by a spill. Therefore, we saw no overriding reason to and did not recommend against the addition of MTBE in the Texas Pipeline system.

The mitigating factors which reduce the risks associated with the addition of MTBE in the Texas Pipeline System do not exist in other areas of the country where we market. From an environmental risk point of view we recommend against introducing MTBE into the Texas Eastern Transmission system and the South East Atlantic Coast.

As we have previously discussed we cannot estimate incremental cost associated with the introduction of MTBE without a contamination impact study on the proposed markets for possible MTBE usage. Real Estate and Engineering, Environmental Engineering does not have sufficient technical manpower in-house to complete a nationwide risk assessment by year-end 1985.

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In order to provide a nationwide risk assessment it would be necessary to contract with an outside consulting firm or an affiliate such as Exxon Production Research Company. Completion of a nationwide risk assessment would require at least six months.

BJM-4664g

c: A. L. Decker
R. R. Eaton
W. E. Gattis

Exhibit 13

<p style="text-align: right;">Page 1</p> <p>1 SUPERIOR COURT OF THE STATE OF CALIFORNIA</p> <p>2 COUNTY OF SAN FRANCISCO</p> <p>3 SOUTH TAHOE PUBLIC UTILITY :</p> <p>4 DISTRICT, :</p> <p>5 Plaintiff, : No. 999128</p> <p>6 vs. :</p> <p>7 ATLANTIC RICHFIELD COMPANY :</p> <p>8 ("ARCO"), et al., :</p> <p>9 Defendants. :</p> <p>10 COMMUNITIES FOR A BETTER :</p> <p>11 ENVIRONMENT, : Civil No.</p> <p>12 Plaintiff, : 997013</p> <p>13 vs. :</p> <p>14 UNOCAL CORPORATION, et al., :</p> <p>15 Defendants. :</p> <p>16 DEPOSITION OF THOMAS RICHARD EIZEMBER</p> <p>17 Washington, D.C.</p> <p>18 Tuesday, August 1, 2000</p> <p>19</p> <p>20 REPORTED BY:</p> <p>21 LEE A. BURSTEN, R.P.R.</p> <p>22</p>	<p style="text-align: right;">Page 3</p> <p>1 SCOTT SUMMY, ESQ.</p> <p>2 GABRIEL REED, ESQ.</p> <p>3 Cooper & Scully, P.C.</p> <p>4 900 Jackson Street</p> <p>5 Suite 100</p> <p>6 Dallas, Texas 75202</p> <p>7 214-712-9509</p> <p>8 On behalf of Plaintiff Communities</p> <p>9 for a Better Environment</p> <p>10</p> <p>11 ROBERT B. WALLIS, ESQ.</p> <p>12 Exxon Mobil Corporation</p> <p>13 800 Bell Street</p> <p>14 Houston, Texas 77002</p> <p>15 713-656-5961</p> <p>16 On behalf of Defendant Exxon Mobil</p> <p>17 Corporation</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p>
<p style="text-align: right;">Page 2</p> <p>1 Deposition of THOMAS RICHARD EIZEMBER,</p> <p>2 called for examination pursuant to notice of</p> <p>3 deposition, on Tuesday, August 1, 2000, in</p> <p>4 Washington, D.C., at the offices of McDermott, Will</p> <p>5 & Emery, 600 Thirteenth Street, N.W., at 10:13 a.m.,</p> <p>6 before LEE A. BURSTEN, a Notary Public in and for</p> <p>7 the District of Columbia, when were present on</p> <p>8 behalf of the respective parties:</p> <p>9</p> <p>10 DUANE C. MILLER, ESQ.</p> <p>11 Miller, Sher & Sawyer, P.C.</p> <p>12 100 Howe Avenue</p> <p>13 Suite S120</p> <p>14 Sacramento, California 95825-8218</p> <p>15 916-924-8600</p> <p>16 On behalf of Plaintiff South Tahoe</p> <p>17 Public Utility District</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p>	<p style="text-align: right;">Page 4</p> <p>1 JONATHAN M. JENKINS, ESQ.</p> <p>2 Latham & Watkins</p> <p>3 633 West Fifth Street</p> <p>4 Suite 4000</p> <p>5 Los Angeles, California 90071-2007</p> <p>6 213-485-1234</p> <p>7 On behalf of Defendant Tosco Corporation</p> <p>8</p> <p>9 ALSO PRESENT:</p> <p>10 RICHARD E. MORTON, ESQ.</p> <p>11 Kilpatrick Stockton LLP</p> <p>12</p> <p>13 T.J. O'TOOLE, Video Operator</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p>

<p style="text-align: right;">Page 9</p> <p>1 of Mines and Technology, 1976. I also have a 2 masters in business administration from St. Mary's 3 College in California in 1985. 4 (Eizember Exhibits 1 through 3 were 5 identified.) 6 BY MR. MILLER: 7 Q I've marked as Exhibits 1 and 2 the 8 notices of this deposition. And can you tell me 9 what Exhibit 3 is, please? 10 A Exhibit 3 is a summary of my employment 11 experience which I provided to my counsel yesterday. 12 Q And basically this explains some of your 13 assignments as an Exxon employee over the years, is 14 that correct? 15 A Yes. This lists all of the various 16 positions that I held while working with Exxon. 17 Q During a portion of your Exxon employment 18 you were associated with their refinery operations 19 in Benicia, California, is that correct? 20 A Yes. In fact I started employment at the 21 Benicia refinery. 22 Q In what year?</p>	<p style="text-align: right;">Page 11</p> <p>1 Q Were you involved in a decision to use 2 MTBE at the Benicia refinery in California? 3 A Yes. 4 Q And when was that decision made, 5 approximately? 6 A In the early '90s. I'm not sure I could 7 place it any closer than that now. 8 Q And did you do an analysis of the 9 advisability of using MTBE prior to the decision? 10 A We did a lot of work evaluating 11 oxygenates. I couldn't characterize it as a single 12 analysis. 13 Q <u>So you evaluated a number of oxygenates,</u> 14 <u>is that correct?</u> 15 A <u>Yes. We examined a number of oxygenates</u> 16 <u>as potential candidates to meet the requirements for</u> 17 <u>supplying oxygenated and reformulated gasoline.</u> 18 Q <u>At the time you made a decision to use</u> 19 <u>MTBE in the Benicia refinery did you know that MTBE</u> 20 <u>had the capability of contaminating groundwater?</u> 21 A <u>Yes. I mean, we knew that there was the</u> 22 <u>potential for gasoline containing any oxygenate to</u></p>
<p style="text-align: right;">Page 10</p> <p>1 A In 1976. 2 Q And how long were you assigned to the 3 Benicia refinery? 4 A I worked at Benicia through 1988. 5 Q And after you left the Benicia refinery in 6 1988, did you continue to have involvement with 7 their fuels program? 8 A "Involvement with their fuels program" 9 meaning? 10 Q Did you work on any issues such as fuel 11 additives like MTBE that would affect the Benicia 12 refinery after you left employment with that 13 refinery? 14 A Yes. When I left that refinery I moved 15 into a position in refining headquarters, where I 16 was responsible for fuels planning for a number of 17 refineries. 18 Q As a part of fuels planning, did you 19 become familiar with a chemical known as MTBE, sir? 20 A Yes, although I can't say for sure whether 21 I became familiar with it while I was at Benicia or 22 while I was in headquarters at Houston.</p>	<p style="text-align: right;">Page 12</p> <p>1 <u>escape into the ground and potentially migrate to</u> 2 <u>groundwater.</u> 3 Q <u>And did you also know that MTBE if it</u> 4 <u>reached groundwater would add an unpleasant taste or</u> 5 <u>odor to the water?</u> 6 A <u>Yes, MTBE in water does have a</u> 7 <u>characteristic smell. Different people have</u> 8 <u>different sensitivities to it.</u> 9 Q <u>By the time you made the decision to use</u> 10 <u>MTBE at the Benicia refinery, were you aware of the</u> 11 <u>fact that MTBE had contaminated public drinking</u> 12 <u>water supply wells in areas in the east of the -- in</u> 13 <u>the eastern United States?</u> 14 A <u>I recall being aware that there had been</u> 15 <u>instances of contamination. I'm not sure I could</u> 16 <u>place the geography sitting here today.</u> 17 Q Was it your understanding that some of 18 those instances involved Exxon gasoline stations? 19 A Sitting here, I don't recall whether it 20 was a general knowledge that there had been 21 instances of contamination or whether they were 22 specific to Exxon retail facilities.</p>

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1 necessarily have reviewed every single one in detail
2 that I produced, and I wouldn't necessarily remember
3 seeing it as I sit here today. And there were
4 likely documents produced from other sources than
5 Exxon besides myself.

6 Q I would like to focus on what you knew
7 prior to the time a decision was made to use MTBE in
8 California gasoline manufactured at your Benicia
9 refinery. Did you know that MTBE was more soluble
10 than most of the other components of gasoline?

11 A Yes, we were aware that MTBE is more
12 soluble than the other hydrocarbon components of
13 gasoline, although less soluble than ethanol, which
14 can be a component of gasoline, and even other
15 oxygenates which can be components of gasoline.

16 Q Were you also aware of the fact that MTBE
17 didn't readily biodegrade in the environment if it
18 was released into the environment at that time?

19 A If you mean by "didn't readily biodegrade"
20 that it biodegrades more slowly than the
21 nonoxygenated components of gasoline, yes, we were
22 aware that MTBE biodegraded less rapidly than other

Page 18

1 hydrocarbon components of gasoline.

2 Q Were you aware that those two
3 characteristics made it more likely that MTBE would
4 contaminate groundwater than the other hydrocarbon
5 constituents of gasoline?

6 A Well, with MTBE being more soluble than
7 the other components, then that information would
8 lead me to believe that yes, it would have more of a
9 tendency to go into groundwater. For the specifics
10 of groundwater hydrology you would need to talk to
11 someone who is an expert in that field.

12 Q And prior to the time the decision was
13 made to add MTBE to Exxon gasoline, were you told
14 that it would be more difficult to remove MTBE from
15 groundwater than many other constituents of
16 gasoline?

17 A We were aware that adding MTBE or other
18 oxygenates could complicate remediation in gasoline
19 spillage. As we were faced with a decision of what
20 oxygenate to add, recognizing we had to add an
21 oxygenate, the decision became one of among which
22 oxygenate to add.

Page 19

1 Q When you say complicate cleaning up a
2 spill, does that include making it more expensive to
3 remove that contaminant from groundwater than other
4 substances?

5 A It's a little bit more complicated than
6 that. As I recall, we knew that it was more
7 difficult potentially to remove MTBE from
8 groundwater than other hydrocarbons. On the other
9 hand, given that MTBE was a little bit more soluble
10 in water and it would tend to move into the water,
11 it could actually serve as an early warning of
12 groundwater contamination and warn one of the
13 contamination incident before it got larger than it
14 might have otherwise.

15 Q Well, how would anybody use MTBE as an
16 early warning device? Could you explain that?

17 A Well, as we already mentioned, the MTBE
18 has a distinctive taste and odor in water at
19 relatively low concentration, lower than many of the
20 other hydrocarbon constituents of gasoline. And as
21 such it would be detected at lower levels of
22 concentration.

Page 20

1 Q Did you know that it had a low taste and
2 odor threshold by the time you made the decision to
3 add MTBE to California gasoline?

4 A We knew it had a distinctive odor and it
5 could be smelled at very low levels. It could be
6 smelled at lower levels of concentration than other
7 hydrocarbons.

8 Q So were you counting on the sense of taste
9 and odor that people have as a method of obtaining
10 an early warning that there had been a gasoline
11 release?

12 A Well, I'm not sure I would say "counting
13 on." It was certainly one of the considerations in
14 comparing, say, MTBE use to ethanol use.

15 Q Are you saying that MTBE would be early
16 warning of a gasoline release because people could
17 taste it in the drinking water that they used that
18 came from the ground?

19 A I'm saying that was -- that's certainly a
20 consideration in the use of MTBE versus some of the
21 other oxygenates, that it could be detected at lower
22 concentrations.

Page 25

1 California?

2 A Yes. We were blending MTBE into gasoline
3 in the '80s, I can't say for sure when the specific
4 date was, in certain areas in the south and
5 southeastern U.S.

6 Q Did you talk to anyone before the decision
7 was made to add MTBE to California gasoline and ask
8 them what problems they were encountering with
9 groundwater contamination with that chemical in the
10 area where it was being used?

11 A Did I specifically ask that question? I
12 can't say if I did or I did not. But I recall
13 during the discussions of oxygenates that the
14 groundwater contamination issue did get discussed.

15 Q Did you ever speak to a Mr. Fred Anderson
16 concerning that subject?

17 A The name is familiar. But I can't sitting
18 here today recall that I had a specific discussion
19 with Fred Anderson.

20 Q Do you recall any discussion of problems
21 experienced in New Jersey with MTBE showing up in
22 groundwater prior to the time the decision was made

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1 concerning the use of MTBE in California?

2 A I don't recall a discussion specific to
3 New Jersey sitting here today. But that doesn't
4 mean there couldn't have been one.

5 Q Did you hear that MTBE had been detected
6 in groundwater in more than 100 Exxon stations in
7 New Jersey alone prior to the time you decided to
8 use MTBE in California?

9 A I don't recall hearing that specific
10 number as I sit here today. But again, that doesn't
11 mean I might not have.

12 Q I'm not talking about the specific number.
13 I'm talking about something in that range as opposed
14 to a precise number. Did you hear anything about
15 that subject, sir?

16 A I don't recall even a general indication
17 of numbers as I sit here today. I recall a
18 discussion of -- that groundwater contamination had
19 occurred in places both where MTBE is used and there
20 was groundwater contamination potential from a
21 non-oxygenate-containing gasoline.

22 Q Didn't you have the impression that your

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1 discussions that if MTBE was added to gasoline and a
2 release of gasoline occurred, that the expense and
3 the difficulty of cleaning up that contamination
4 would be greater, significantly greater if MTBE were
5 used than if it weren't?

6 A If the question is relative to gasoline
7 containing MTBE versus gasoline containing no
8 oxygenate, then yes, as I recall we did have
9 information, the indications, discussions, that it
10 was -- it could be more expensive to clean up MTBE
11 in groundwater. Relative to the question of the
12 ultimate remediation issue of an oxygenated gasoline
13 with MTBE versus an oxygenated gasoline with
14 something else, the discussions were far less
15 conclusive in that regard.

16 Q Did you draft any documents for the folks
17 who managed Exxon's gasoline remediation programs in
18 California advising them that since MTBE was being
19 added to the gasoline, they should make more prompt
20 and vigorous efforts to clean up any spills than
21 they would without that component of gasoline?

22 A If you're asking did I draft personally,

Page 28

1 no, I don't recall writing such a document. Did
2 Exxon in general draft such a document? I would
3 have to say that we provide ongoing and routine
4 training to people that makes it clear that spilling
5 gasoline is not the way we would prefer gasoline to
6 be handled, and any spills, oxygenated or
7 nonoxygenated gasoline, should be cleaned up as
8 quickly as possible.

9 Q But did anyone employed by Exxon to your
10 knowledge specifically mention MTBE as a reason why
11 more aggressive efforts were needed?

12 A No. Well, I think we were saying that our
13 focus on not spilling gasoline and not spilling --
14 and cleaning up any spill as quickly as possible
15 would be equally applicable to gasoline without
16 MTBE, gasoline without any oxygenates, gasoline with
17 ethanol. Gasoline should not be spilled to the
18 environment, and it should be cleaned up as quickly
19 as possible when it is spilled, whether it's got
20 MTBE in it or not.

21 Q To your knowledge did anyone in Exxon
22 advise Exxon employees in California that since MTBE

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1 California, do you recall having any conversations
2 or discussions with the environmental engineering
3 department at Exxon?

4 A I guess I'm not sure what you mean by "the
5 environmental engineering decision [sic]." When we
6 considered which oxygenate to use to meet the
7 oxygenate mandate in California, we had involved in
8 the discussions folks from our environmental safety
9 and health -- I'm sorry, involved in discussions
10 about which oxygenate to use to meet the required
11 oxygenate regulations in California, we had
12 discussions with folks at environmental safety and
13 health, Bill Flis is one of the people in that group
14 that we saw in an earlier document here, the
15 marketing folks, Vic Dugan had access to his own
16 group of engineering, and some of them are
17 specifically environmental type engineering around
18 station design, remediation, that kind of thing.

19 We also had discussions through Bill
20 Flis's group with Exxon biomedical sciences and
21 Exxon research and engineering, so that there were a
22 number of different groups that all might have

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1 various aspects of what you could call environmental
2 engineering.

3 Q You talked earlier about the fact that at
4 the time this decision was made, you were aware of
5 MTBE's characteristics in groundwater, which would
6 include its solubility, its resistance to
7 biodegradation, low odor and taste thresholds. Do
8 you recall that testimony?

9 A Yes, I recall that we testified we knew a
10 lot about the various physical characteristics of
11 all of the different oxygenate options.

12 Q When did you learn those characteristics
13 of MTBE?

14 A As a company, Exxon has been aware of some
15 of those characteristics as long as Exxon has
16 employed chemical engineers, given that some of them
17 are physical properties of the oxygenates. I think,
18 as we testified earlier, Exxon was aware of some of
19 the groundwater contamination by gasoline in general
20 as well as gasoline with MTBE in the early '80s.

21 Certainly I think we became as an industry
22 more and more aware of the differences in air

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1 emissions effects of the different oxygenates. In
2 the late '80s and early '90s we did substantial
3 additional research that was done then.

4 Q Is it your testimony that a chemical
5 engineer would be familiar with the chemical
6 properties of MTBE which make up some of these
7 characteristics as to how it reacts in groundwater
8 once it's released?

9 A Would you try that question on me again,
10 please?

11 Q I'll let him. I may not be able to say it
12 again.

13 A That's fine.

14 (Requested portion of record read.)

15 THE WITNESS: Well, I think if you wanted
16 to understand the specifics of how something would
17 act in groundwater, you would probably go to someone
18 who is more specifically trained in underground
19 hydrology. Chemical engineering in general includes
20 training in a lot of general chemistry and organic
21 chemistry, and that would include some of the
22 general properties of ethers and alcohols and all

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1 kinds of other properties.

2 But it would probably take either some
3 more specific training to be able to immediately
4 translate those to definitive conclusions about how
5 something may act in groundwater. One would have a
6 general indication of how they would behave. For
7 instance, alcohols tend to be very soluble in water
8 compared to hydrocarbon compounds and ethers, for
9 instance.

10 BY MR. SUMMY:

11 Q Wouldn't you agree that because of MTBE's
12 characteristics in groundwater, that it's very
13 important to keep gasoline containing MTBE in the
14 tanks and lines at the various retail service
15 station sites?

16 A I believe I testified earlier it's
17 important to keep gasoline, period, whether it
18 contains MTBE or not, contained and not released
19 into the environment.

20 Q Are you aware that many of the oil
21 companies in California have conducted surveys to
22 determine the percentage of retail service stations

Exhibit 14

CONFIDENTIAL (PER 2004 MDL 1358 ORDER)

541

1 UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

2

3 - - -

4 IN RE: : Master File

: No. 1:00-1898

5 Methyl Tertiary : MDL No.: 1358

Butyl Ether ("MTBE") : (SAS) M21-88

6 Products Liability :

Litigation :

7

8 CONFIDENTIAL (PER 2004 MDL 1358 ORDER)

- - -

9

June 28, 2006

10

11 - - -

12

Continued videotaped deposition
13 of NOEL VANCE WOOD, III, held in the
offices of the New York City Law
14 Department, 100 Church Street, New York,
New York 10007, commencing at 9:55 a.m.,
15 on the above date, before Linda Rossi
Rios, a Federally Approved Registered
16 Professional Reporter and Notary Public.

17

18 - - -

19

20

21

22 GOLKOW LITIGATION TECHNOLOGIES

Four Penn Center, Suite 1210

23 1600 John F. Kennedy Boulevard

Philadelphia, Pennsylvania 19103

24 (877) DEPS-USA

WOOD - CONFIDENTIAL (PER 2004 MDL 1358 ORDER)

593

1 of MTBE?

2 A. As I had previously

3 testified, is that -- and, again, I

4 confirmed this with Mr. Sagebien, Mr.

5 Bernstein, I believe it was just those

6 two on this time. Again, that they were

7 not aware of a fate and transport

8 phenomenon specifically to MTBE at the

9 time of 1988 even up through 19 -- well,

10 Mr. Sagebien's recollection is --

11 probably is, again, as I previously

12 testified, about the mid-'90s he became

13 aware of, and the corporation became

14 aware of, what you're referring to as

15 fate and transport of MTBE in the

16 groundwater. And they did reconfirm

17 that.

18 Q. Just going back to, I think

19 it's Exhibit 11, I just -- I wanted to

20 ask you this and I forgot. Did -- is

21 there anything else that you -- that Mr.

22 Bernstein or Mr. Angelletta discussed

23 with you that you did not tell me with

24 regard to this document that you can --

GOLKOW LITIGATION TECHNOLOGIES



May 7 2009
5:11PM

**UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK**

**IN RE METHYL TERTIARY BUTYL ETHER
PRODUCTS LIABILITY LITIGATION**

This document pertains to:

*Commonwealth of Puerto Rico, et al. v. Shell Oil
Company, et al.,
Case No. 07-CIV-10470*

Master File No. 1:00-1898
MDL 1358 (SAS)
M21-88

**CORPORATE DISCLOSURE STATEMENT FOR
HESS OIL VIRGIN ISLANDS CORP.**

Pursuant to Rule 7.1 of the Federal Rules of Civil Procedure, Defendant Hess Oil Virgin Islands Corp. ("HOVIC") submits the following Corporate Disclosure Statement:

Hess Corporation owns 100% of HOVIC's stock.

Dated: May 7, 2009

Steven L. Leifer
BAKER BOTTS, L.L.P.
The Warner Building
1299 Pennsylvania Ave., N.W.
Washington, DC 20004-2402
(202) 639-7723
(202) 585-1040 (fax)

*Attorney for Defendant Hess Oil Virgin Islands
Corp.*

Exhibit 15

HESS OIL VIRGIN ISLANDS CORP.**M a t e r i a l S a f e t y D a t a S h e e t****3557****METHYL TERTIARY BUTYL ETHER (MTBE)****1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION (Rev. 09/94)**

Hess Oil Virgin Island Corp.
P.O. Box 127, Kingshill
St. Croix, USVI 00851

Telephone Number: (809) 778-4000

EMERGENCY TELEPHONE NUMBER
CHEMTREC (800) 424-9300 24 hrs

PRODUCT NAME: Methyl tert-butyl ether (MTBE)
CHEMICAL NAME: 2-Methoxy-2-Methylpropane
CHEMICAL FAMILY: Alkyl Ether
CHEMICAL FORMULA: C₅H₁₂O
MSDS IDENTIFICATION CODE/NUMBER: 9922

SYNONYMS: Methyl t-Butyl Ether; t-butyl methyl ether;
MTBE

See Section 16. for Glossary of terms and acronyms.

2. COMPOSITION/INFORMATION ON INGREDIENTS (Rev. 09/94)

INGREDIENT NAME	EXPOSURE LIMITS	CONCENTRATION PERCENT BY WEIGHT
Methyl tertiary butyl ether (MTBE) CAS NUMBER: 1634-04-4	OSHA: none established ACGIH TLV-TWA: 40 ppm AIHA WEL TWA: 100 ppm	> 97.0

MTBE is used as an octane booster and oxygenate for unleaded gasoline.

3. HAZARDS IDENTIFICATION (Rev. 09/94)

***** EMERGENCY OVERVIEW *****
***** DANGER! *****

***** FLAMMABLE LIQUID - EYE, SKIN, AND MUCOUS MEMBRANE IRRITANT *****
***** CENTRAL NERVOUS SYSTEM DEPRESSANT *****
***** HARMFUL OR FATAL IF SWALLOWED - ASPIRATION HAZARD *****

***** High fire hazard. Keep away from heat, spark, open flame, and other *****
***** ignition sources. *****

***** Contact may cause eye, skin and mucous membrane irritation. Avoid *****
***** prolonged breathing of vapors or mists. Inhalation may cause irritation, *****
***** anesthetic effects, (dizziness, nausea, headache, intoxication), and *****
***** respiratory system effects. *****

***** If ingested, do NOT induce vomiting, as this may cause chemical pneumonia *****
***** (fluid in the lungs). *****

POTENTIAL HEALTH EFFECTS**PRIMARY ROUTES OF ENTRY**

Eyes: No Skin: No Inhalation: Yes Ingestion: Yes

EYES

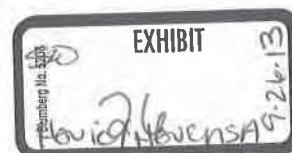
Vapors may cause slight irritation to the eyes, causing redness and tearing.

SKIN

May cause mild irritation to the skin and mucous membranes upon prolonged and/or repeated contact.

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METHYL TERTIARY BUTYL ETHER (MTBE)

3. HAZARDS IDENTIFICATION - Continued

SKIN - Continued

High pressure skin injections are serious medical emergencies. The appearance of injury may be delayed for a few hours, but may cause tissue to become swollen, discolored and extremely painful; permanent damage or death may result without adequate medical treatment.

INGESTION

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, such as irritation, nausea, vomiting, diarrhea, restlessness, and central nervous system effects similar to alcohol intoxication. Acute symptoms of intoxication are most common, including excitation, restlessness, incoordination, euphoria, headache, fatigue, dizziness, drowsiness and blurred vision. In more severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest or death may occur.

INHALATION

Inhalation of mists or vapors may cause nose and throat irritation, anesthetic effects and central nervous system (CNS) depression. Inhalation may result in dizziness, drowsiness, shortness of breath, headache, and other symptoms similar to those listed under "Ingestion".

WARNING: The burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, with associated adverse health effects, such as asphyxiation and death.

CHRONIC EFFECTS/CARCINOGENICITY

This product is not expected to cause chronic (long-term) health effects in humans, especially at exposure levels anticipated in the occupational environment (generally well below the exposure limits presented in Section 2 based on data presented to the US EPA by API regarding exposures during the manufacture, distribution, and retail sales of MTBE and oxygenated gasoline).

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash) conditions. Chronic respiratory disease, or pre-existing central nervous system disorders may be aggravated by exposure.

4. FIRST AID MEASURES (Rev. 09/94)

EYES

In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 minutes. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops. High pressure injections are serious medical emergencies - seek immediate medical attention.

INGESTION

DO NOT INDUCE VOMITING BECAUSE OF DANGER OF BREATHING LIQUID INTO LUNGS. Seek immediate medical attention. Rinse mouth with water. Administer 1 to 2 glasses of water or milk to drink. Never administer liquids to an unconscious person.

If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Seek medical attention. Monitor for breathing difficulty.

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METHYL TERTIARY BUTYL ETHER (MTBE)

4. FIRST AID MEASURES - Continued

INHALATION

Remove person to fresh air. If person is not breathing, ensure an open airway and administer CPR. If necessary, provide additional air or oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES (Rev. 09/94)

FLAMMABLE PROPERTIES

FLASH POINT: -14°F -25°C
 AUTOIGNITION: AP 815°F 435°C
 FLAMMABILITY CLASS: IA
 LOWER EXPLOSIVE LIMIT (%): 1.6
 UPPER EXPLOSIVE LIMIT (%): 8.4

FIRE AND EXPLOSION HAZARDS

OSHA and NFPA Class IA FLAMMABLE LIQUID. Liquids releases flammable vapors at well below ambient temperatures and readily forms a flammable mixture with air. Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Container may explode in heat or fire. Runoff to sewer may cause fire or explosion hazard.

This product burns with a blue flame which is often less visible than gasoline or other petroleum hydrocarbons flames.

EXTINGUISHING MEDIA

SMALL FIRES: Any extinguisher suitable for Class B fires - dry chemical, CO₂, water spray, firefighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Firefighting foam suitable for polar solvents is recommended.

FIRE FIGHTING INSTRUCTIONS

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water.

For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES (Rev. 09/94)

ACTIVATE YOUR FACILITY'S SPILL CONTINGENCY PLAN (e.g. SPCC, RCRA, OPA, or EMERGENCY plan), if available.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas..

Carefully contain and stop the source of the spill, if safe to do so. Protect



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METHYL TERTIARY BUTYL ETHER (MTBE)

6. ACCIDENTAL RELEASE MEASURES - Continued

bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless the system is designed and permitted to handle such materials. The use of fire fighting foam may be useful in certain situations to reduce vapors.

SMALL SPILLS: Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal. Cleanup crews must be properly trained and must utilize proper protective equipment.

LARGE SPILLS: Dike far ahead of the spill. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection as well as protect personnel attempting to stop leak. Consideration should be given to environmental clean-up and waste material generation when determining if the use of large volumes of water is appropriate for non-fire emergency situations. Cleanup crews must be properly trained and must utilize proper protective equipment.

7. HANDLING AND STORAGE (Rev. 09/94)

HANDLING PRECAUTIONS

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! No smoking or open flame in storage, use or handling areas. Keep containers closed and clearly labeled. Ground all drums and transfer vessels when handling. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition. Use only with adequate ventilation. Avoid breathing vapors. Do not use as a cleaning agent. Wash thoroughly after handling. Electrical equipment should be approved for classified area.

STORAGE PRECAUTIONS

Store in a well-ventilated area. This storage area should comply with NFPA 30 ("Flammable and Combustible Liquid Code"). Avoid storage near incompatible materials.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as MTBE). (See The American Petroleum Institute Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents"). The cleaning of tanks previously containing this product should follow API Recommended Practice RP 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES

Emergency eye wash capability should be available in the vicinity of any potential exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective.

Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION (Rev. 09/94)

ENGINEERING CONTROLS

Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use explosion-proof equipment and lighting in classified/controlled

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METHYL TERTIARY BUTYL ETHER (MTBE)

8. EXPOSURE CONTROLS/PERSONAL PROTECTION - Continued

ENGINEERING CONTROLS - Continued
areas.EYE/FACE PROTECTION

Safety glasses and faceshield or chemical splash goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION

Avoid repeated or prolonged skin contact. Gloves constructed of nitrile or PVC are recommended. Chemical protective clothing such as of Barricade (R) or equivalent recommended based on degree of exposure.

(R) - Barricade is a registered trademark of E.I. DuPont.

Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, and NIOSH Respirator Decision Logic for additional guidance on respiratory protection.

9. PHYSICAL AND CHEMICAL PROPERTIES (Rev. 09/94)

APPEARANCE

A clear, colorless, water-like liquid.

ODOR

A sweet, ether-like odor.

ODOR THRESHOLD

Odor detectable at 0.05 ppm and recognizable at 0.13 ppm. Highly odorous.

BASIC PHYSICAL PROPERTIES

BOILING POINT: 131°F 55°C

VAPOR PRESSURE: 7.8 psi@100°F (38°C)

VAPOR DENSITY (AIR=1): 3.1

SPECIFIC GRAVITY: (water = 1.0) AP 0.74 @ 68°F

SOLUBILITY (H₂O): (water) AP 5% @ 68°F (20°C)

PERCENT VOLATILES: 100

10. STABILITY AND REACTIVITY (Rev. 09/94)

STABILITY: Stable

CONDITIONS TO AVOID (STABILITY)

Material is stable under normal conditions. Avoid high temperatures, open flames, sparks, welding, smoking and other ignitions sources.

INCOMPATIBLE MATERIALS

Keep away from strong oxidizers, ignition sources and heat; Viton (R); Fluorel (R).

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke), irritating aldehydes and ketones, and other toxic vapors.

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METHYL TERTIARY BUTYL ETHER (MTBE)

10. STABILITY AND REACTIVITY - Continued

HAZARDOUS POLYMERIZATION: Will Not Occur

11. TOXICOLOGICAL INFORMATION (Rev. 09/94)

SKIN EFFECTS

Practically non-toxic - Dermal LD50 (rabbit): 10.2 g/kg

ACUTE ORAL EFFECTS

Slightly toxic - LD50 (rat): 4.0 ml/kg

ACUTE INHALATION EFFECTS

LC50 (rat): 85 mg/kg/4 hour exposure.

CHRONIC EFFECTS/CARCINOGENICITY

Carcinogenicity - NTP: No IARC: No OSHA: No ACGIH: No

MISCELLANEOUS TOXICOLOGICAL INFORMATION

Summary of MTBE toxicity:

Male mice: Repeated and prolonged exposure to high levels of MTBE vapor caused higher than expected mortality due to urinary tract obstructions.

Female mice: Increased incidence of benign liver tumors.

Male rats: Prolonged and repeated exposures of high levels (up to 8000 ppm over 15 months) produced excess mortality, possibly due to kidney damage; also observed were increased numbers of benign and malignant kidney tumors and benign testicular tumors.

Mice: Embryo/fetal toxicity and birth defects were observed, but only at doses that were toxic to the mother (5000 ppm). No such effects were observed in rabbits at the same doses.

The significance of these findings to humans is unclear, especially because animal exposure levels were much higher than would be expected in the work environment; however, workers should minimize exposure to MTBE vapor.

12. ECOLOGICAL INFORMATION (Rev. 09/94)

Keep out of sewage, drainage and waterways. Report spills and releases, as applicable, under Federal and State regulations.

If released, MTBE will be expected to exhibit fairly high mobility in soil, and therefore may leach into groundwater. Refer to API Publication 4497, "Cost-Effective, Alternative Treatment Technologies For Reducing the Concentrations of Ethers and Alcohols in Groundwater."

13. DISPOSAL CONSIDERATIONS (Rev. 09/94)

Maximize product recovery for reuse or recycling. Contaminated materials may be classified as RCRA Hazardous Waste due to the low flash point. Also consult state regulations. Dispose of waste in accordance with all applicable state and federal regulations.

14. TRANSPORT INFORMATION (Rev. 09/94)

PROPER SHIPPING NAME: Methyl tert-butyl ether

HAZARD CLASS: 3

DOT IDENTIFICATION NUMBER: UN2398

DOT SHIPPING LABEL: FLAMMABLE LIQUID

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Material Safety Data Sheet

METHYL TERTIARY BUTYL ETHER (MTBE)

15. REGULATORY INFORMATION (Rev. 09/94)

U.S. FEDERAL REGULATORY INFORMATION

Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal reporting requirements. Consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS):

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow-up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

This product and its constituents listed herein are on the EPA TSCA Inventory.

SARA TITLE III NOTIFICATIONS AND INFORMATION
REPORTABLE QUANTITY (POUNDS): 1

SARA TITLE III - HAZARD CLASSES: Acute Health Hazard
Fire Hazard

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS NUMBER	INGREDIENT NAME	PERCENT BY WEIGHT
1634-04-4	Methyl tertiary butyl ether (MTBE)	> 97.0

This information must be included on all MSDSs that are copied and distributed for this material.

U.S. STATE REGULATORY INFORMATION

Any spill or uncontrolled release of this product may be subject to state and/or local reporting requirements. This product and/or its constituents may also be subject to other regulations at the state and/or local level. Consult those regulations applicable to your facility/operation.

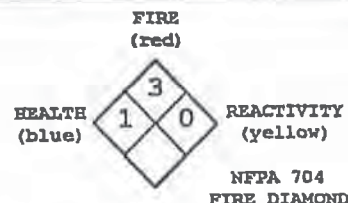
CANADIAN REGULATORY INFORMATION

WHMIS: Class B, Division 2 (Flammable Liquid)
Class D, Division 1, Subdivision B (Toxic other means)

16. OTHER INFORMATION (Rev. 09/94)

NFPA HAZARD RATING - HEALTH: 1 Slight
- FIRE: 3 High
- REACTIVITY: 0 Negligible

HMIS HAZARD RATING - HEALTH: 1 Slight
- FIRE: 4 Extreme
- REACTIVITY: 1 Slight



MSDS IDENTIFICATION CODE/NUMBER: 9922

SUPERCEDES MSDS DATED: 09/25/92

Glossary:

AP = Approximately < = Less than > = Greater than
N/A = Not Applicable N/D = Not Determined ppm = parts per million

Acronyms:

ACGIH = American Conference of Governmental Industrial Hygienists

Revision Date: 09/30/94

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Material Safety Data Sheet

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METHYL TERTIARY BUTYL ETHER (MTBE)

16. OTHER INFORMATION - Continued

AIHA	=	American Industrial Hygiene Association
ANSI	=	American National Standards Institute (212) 642-4900
API	=	American Petroleum Institute (202) 682-8000
CERCLA	=	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	=	U.S. Department of Transportation
EPA	=	U.S. Environmental Protection Agency
HMIS	=	Hazardous Materials Information System
IARC	=	International Agency For Research On Cancer
MSHA	=	Mine Safety and Health Administration
NFPA	=	National Fire Protection Association (617) 770-3000
NOIC	=	Notice of Intended Change (proposed change to ACGIH TLV)
NIOSH	=	National Institute of Occupational Safety and Health
NTP	=	National Toxicology Program
OPA	=	Oil Pollution Act of 1990
OSHA	=	U.S. Occupational Safety & Health Administration
PEL	=	Permissible Exposure Limit (OSHA)
RCRA	=	Resource Conservation and Recovery Act
REL	=	Recommended Exposure Limit (NIOSH)
SARA	=	Superfund Amendments and Reauthorization Act of 1986 Title III
SCBA	=	Self-Contained Breathing Apparatus
SPCC	=	Spill Prevention, Control, and Countermeasures
STEL	=	Short-Term Exposure Limit (generally 15 minutes)
TLV	=	Threshold Limit Value (ACGIH)
TSCA	=	Toxic Substances Control Act
TWA	=	Time Weighted Average (8 hr.)
WEEL	=	Workplace Environmental Exposure Level (AIHA)
WHMIS	=	Canadian Workplace Hazardous Materials Information System

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgement.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.



NFPA 704 (Section 16)

HOVENSA

MATERIAL SAFETY DATA SHEET

Methyl tert-Butyl Ether (MTBE)
MSDS No. 3557
1. CHEMICAL PRODUCT and COMPANY INFORMATION (rev. May-99)
HOVENSA L.L.C.
1 Estate Hope
Christiansted, VI 00820-5652
EMERGENCY TELEPHONE NUMBER (24 hrs): CHEMTREC (800)424-9300
COMPANY CONTACT (business hours): HOVENSA Safety Department (340) 692-3000
SYNONYMS: 2-methoxy-2-methyl propane; Methyl t-butyl ether; MTBE; t-butyl methyl ether

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and INFORMATION ON INGREDIENTS (rev. May-99)

INGREDIENT NAME	EXPOSURE LIMITS	CONCENTRATION PERCENT BY WEIGHT
Methyl-tertiary butyl ether (MTBE) CAS NUMBER: 1634-04-4	OSHA PEL-TWA/STEL: None established ACGIH TLV-TWA: 40 ppm, A3	> 97%

 MTBE (C₅H₁₂O) is used as an octane booster and oxygenate for unleaded gasoline.

3. HAZARDS IDENTIFICATION (rev. Apr-98; Tox-98)
EMERGENCY OVERVIEW
DANGER!
EXTREMELY FLAMMABLE - EYE AND MUCOUS MEMBRANE IRRITANT - EFFECTS CENTRAL NERVOUS SYSTEM - HARMFUL OR FATAL IF SWALLOWED - ASPIRATION HAZARD

High fire hazard. Keep away from heat, spark, open flame, and other ignition sources.

Contact may cause eye, skin and mucous membrane irritation. Avoid prolonged breathing of vapors or mists. Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects.

If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs).

EYES

Contact with the eye may cause slight to mild irritation.

SKIN

Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

INGESTION

The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting, and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

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Revision Date: 05/04/99

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HOVENSA 090037

HOVENSA

MATERIAL SAFETY DATA SHEET

Methyl tert-Butyl Ether (MTBE)
MSDS No. 3557

INHALATION

Excessive exposure may cause irritation to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY

This product has produced cancer, developmental and systemic toxicity in laboratory animals following repeated exposure. The significance of these results to human exposures has not been determined – see Section 11, Toxicological Information.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash) conditions. Chronic respiratory disease, or pre-existing central nervous system disorders may be aggravated by exposure.

4. FIRST AID MEASURES (rev. Apr-98; Tox-98)

EYES

In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN

Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION

Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES (rev. Nov-96)

FLAMMABLE PROPERTIES:

FLASH POINT:	-14 °F (-25 °C)
AUTOIGNITION TEMPERATURE:	AP 815 °F (435 °C)
OSHA/NFPA FLAMMABILITY CLASS:	1B (flammable liquid)
LOWER EXPLOSIVE LIMIT (%):	1.6
UPPER EXPLOSIVE LIMIT (%):	8.4

FIRE AND EXPLOSION HAZARDS

Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

This product burns with a blue flame which is often less visible than gasoline or other petroleum hydrocarbons flames.

HESS 237751

Revision Date: 05/04/99

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HOVENSA

MATERIAL SAFETY DATA SHEET

Methyl tert-Butyl Ether (MTBE)
MSDS No. 3557

EXTINGUISHING MEDIA

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO₂, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam suitable for polar solvents. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Firefighting foam suitable for polar solvents is recommended - refer to NFPA 11 "Low Expansion Foam."

FIRE FIGHTING INSTRUCTIONS

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES (rev. Apr-98)

ACTIVATE FACILITY SPILL CONTINGENCY or EMERGENCY PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE (rev. Apr-98)

HANDLING PRECAUTIONS

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

STORAGE PRECAUTIONS

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Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION (rev. Nov-96)

ENGINEERING CONTROLS

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

EYE/FACE PROTECTION

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION

Gloves constructed of nitrile or neoprene are recommended. Chemical protective clothing such as of E.I. DuPont Tychem®, Barricade®, or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION

A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection.

9. PHYSICAL and CHEMICAL PROPERTIES (rev. Sep-94)

APPEARANCE

A clear, water-like liquid

ODOR

A sweet, ether-like odor.

ODOR THRESHOLD

Odor detectable at 0.05 ppm and recognizable at 0.13 ppm. Highly odorous.

BASIC PHYSICAL PROPERTIES

BOILING POINT: 131 °F (55 °C)
VAPOR PRESSURE: 7.8 PSI @ 100 °F (38 °C)

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VAPOR DENSITY (air = 1): 3.1
 SPECIFIC GRAVITY (H₂O = 1): 0.74
 EVAPORATION RATE: ND - probably high
 PERCENT VOLATILES: 100 %
 SOLUBILITY (H₂O): AP 5% @ 68 °F (20 °C)

10. STABILITY and REACTIVITY (rev. Sep-94)

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID and INCOMPATIBLE MATERIALS

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Keep away from strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke), irritating aldehydes and ketones, and other toxic vapors.

11. TOXICOLOGICAL PROPERTIES (rev. Apr-98)

ACUTE EFFECTS

Acute Dermal:	LD50 (rabbit): >10 g/kg	Eye Irritation (rabbits): mild to moderate
Acute Inhalation:	LC50 (rat): 35,000 ppm	Dermal irritation (rabbit): slight
Acute Oral:	LD50 (rat): 4.0 ml/kg	Dermal Sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY

Carcinogenic: IARC: NO NTP: NO OSHA: NO ACGIH: A3 (animal carcinogen)
 MTBE has demonstrated some evidence of developmental toxicity in animal models.

MUTAGENICITY (genetic effects)

MTBE was positive in a single mutagenicity study following activation.

12. ECOLOGICAL INFORMATION (rev. Apr-98)

Keep out of sewers, drainage and waterways. Report spills and releases, as applicable, under Federal and State regulations. If released, MTBE will be expected to exhibit fairly high mobility in soil, and therefore may leach into groundwater. Refer to API Publication 4497, "Cost-Effective, Alternative Treatment Technologies For Reducing the Concentrations of Ethers and Alcohols in Groundwater."

13. DISPOSAL CONSIDERATIONS (rev. Apr-98)

Consult federal, state and local waste regulations to determine appropriate disposal options.

14. TRANSPORTATION INFORMATION (rev. Sep-94)

PROPER SHIPPING NAME:	Methyl tert-butyl ether
HAZARD CLASS AND PACKING GROUP:	3, PG II
DOT IDENTIFICATION NUMBER:	UN 2398
DOT SHIPPING LABEL:	FLAMMABLE LIQUID

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15. REGULATORY INFORMATION (rev. Nov-96)

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, to state and/or local reporting requirements. This product and/or its constituents may also be subject to other regulations at the federal, state and/or local level. Consult those regulations applicable to your facility / operation. Consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow-up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

MTBE is a CERCLA hazardous substance and as such is subject to CERCLA and SARA federal reporting requirements. Reportable Quantity (pounds): 1000

SARA SECTION 311/312 - HAZARD CLASSES

ACUTE HEALTH	CHRONIC HEALTH	FIRE	SUDDEN RELEASE OF PRESSURE	REACTIVE
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

INGREDIENT NAME	CONCENTRATION PERCENT BY WEIGHT
Methyl-tertiary butyl ether (MTBE) CAS NUMBER: 1634-04-4	> 97

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 2 (Flammable Liquid)
Class D, Division 2, Subdivision B (Toxic by other means)

16. OTHER INFORMATION (rev. May-99)

NFPA® HAZARD RATING	HEALTH:	1	Slight
	FIRE:	3	High
	REACTIVITY:	0	Negligible

HMIS® HAZARD RATING	HEALTH:	1*	Slight
	FIRE:	3	Serious
	REACTIVITY:	0	Negligible
			* Chronic

SUPERSEDES MSDS DATED: 04/07/99

ABBREVIATIONS:

AP = Approximately < = Less than > = Greater than
N/A = Not Applicable N/D = Not Determined ppm = parts per million

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ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists	NTP	National Toxicology Program
AIHA	American Industrial Hygiene Association	OPA	Oil Pollution Act of 1990
ANSI	American National Standards Institute (212)642-4900	OSHA	U.S. Occupational Safety & Health Administration
API	American Petroleum Institute 202)682-8000	PEL	Permissible Exposure Limit (OSHA)
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act	RCRA	Resource Conservation and Recovery Act
DOT	U.S. Department of Transportation [General Info: (800)467-4922]	REL	Recommended Exposure Limit (NIOSH)
EPA	U.S. Environmental Protection Agency	SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
HMIS	Hazardous Materials Information System	SCBA	Self-Contained Breathing Apparatus
IARC	International Agency For Research On Cancer	SPCC	Spill Prevention, Control, and Countermeasures
MSHA	Mine Safety and Health Administration	STEL	Short-Term Exposure Limit (generally 15 minutes)
NFPA	National Fire Protection Association (617)770-3000	TLV	Threshold Limit Value (ACGIH)
NIOSH	National Institute of Occupational Safety and Health	TSCA	Toxic Substances Control Act
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)	TWA	Time Weighted Average (8 hr.)
		WEEL	Workplace Environmental Exposure Level (AIHA)
		WHMIS	Canadian Workplace Hazardous Materials Information System

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